MYSTERIES OF EGYPTIAN ZODIACS
And Other Riddles of Ancient History
A GUIDE TO DATING ANCIENT ASTRONOMICAL DATA

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Preface

We are all aware that history can not be considered as an area of knowledge where the portrayed facts are scientifically supported. It was always an arena for political or nationalistic manipulations and smaller or larger falsification. Ancient history is not an exception and in fact its problems are more serious than one could suspect.

All the authors of this book are mathematicians and we would like to illustrate how modern applied mathematics can be used to investigate the chronology of ancient events. Our results challenge the correctness of the ancient chronology supported by the overwhelming opinion of reputable experts in history. It is not our intention to create a sensation or to discredit anybody. Our objective is to attract more attention to a serious scientific problem.

We are aware that it was always extremely hard to introduce principally new ideas in any field of knowledge. There are numerous examples in physics, mathematics, biology, medicine and other sciences, when the new theories were only accepted after long years of absolute rejection by almost all experts. Nevertheless, every area of science had its turning points when, with hesitation and lots of pain, old and well established knowledge was rejected to accept new concepts. Such reversals happened before in astronomy, mechanics, chemistry, physics and even in mathematics. There were also reversals in economics and psychology as well. Surprisingly, the historical chronology throughout the last four centuries remains intact. There was no significant improvement of the chronology in spite of the computer technology and modern methods of data analysis.

Nowadays, more and more mathematics is used in the social sciences. During the last century, economics owes its development to mathematics. There is a growing need for mathematics in psychology, sociology, demography, social epidemiology and criminology. Not surprisingly, mathematics is also trying to make its contribution in areas that seem to be quite distant from it.

Historical chronology, when it was created in the 17th century was considered as a part of mathematics (even J. Scaliger, who is know as the creator of the presently accepted version of the chronology, considered himself as a mathematician). Later, it was incorporated as a part of history, which is a pure social science not relying on the natural sciences methodology. Without solid scientific tools, historians are not able to solve principal problems existing in the chronology (clearly, problems exist in any area of knowledge). In our book, we will show that there are serious problems in a very foundation of the conventional chronology.

How anybody can be sure that historical events we learned about in school, from books or even movies, really took place? Maybe some of them are simply fairy tales or fantasies that are considered now to be historical facts. However, a prevailing opinion is that there is no reason to worry about the accuracy of the conventional chronology. Historians claim that their work provides us with clear and comprehensive explanations of every historical epoch and that strictly scientific methods, for example the *carbon-14 dating* and *dendrochronology* support it. However, there are serious problems with usage of physical methods for supporting the conventional chronology. We do not want to discuss this problem here and we refer the interested reader to the books [103] and [115].

The astronomical dating, using contemporary scientific theories, remains in fact the only method that can produce reliable **precise dates** for ancient events. In particular, remains of old Egyptian zodiacs containing horoscopes are important material for such dating. Analysis of some of these horoscopes was already attempted in the 18th and 19th centuries but did not lead to any solid date.

Recently it was discovered (see [114]) that Egyptian zodiacs contain much more astronomical information that it was previously believed. This gave us an opportunity to establish dozens of unique dates from the ancient Egyptian history. It appears that **it is possible to determine with very high confidence the exact dates represented on the Egyptian zodiacs**.

In this book we have collected many accessible to us old Egyptian zodiacs containing valid astronomical data (horoscopes), which were created in form of reliefs, carvings in stone or paintings. The purpose of this book is to analyze and astronomically date all those zodiacs. The obtained dates appear to be much later than it is suggested in the conventional chronology of Egypt.

We are not going to discuss in this book how serious are the implications of these new dates on ancient history. Our only objective is to present a serious scientific evidence without making any *a priori* assumption of its correctness or incorrectness. Our research is independent of the restrictions imposed by the conventional chronology. Being mathematicians, we simply solve the puzzle of ancient Egypt zodiacs,

where the hidden dates were encoded inside the horoscopes. We find these dates and let them speak for themselves.

We are using here the results that were obtained by A.T. Fomenko and G.V. Nosovsky, and were published in Russia in 2001 (see [114]). However, it is not a translation of the original Russian book, but it is a different presentation of the same material with many new illustrations and some new results obtained recently. We do not require from the reader any mathematical background or astronomical knowledge. All the information necessary for a complete understanding of the problem and the methods presented in this book is included and carefully explained. We also provide our readers with the tools to conduct their further independent research. The special software used for the computations of the dates on the Egyptian zodiacs and high resolution images of the Egyptian zodiacs, are available form the web sites listed in this book. All the technicalities are separated from the main text and placed in Appendixes.

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Chapter 1

The Problems of Historical Chronology

1.1 Creation of the Contemporary Chronology of the Ancient Times

Let us discuss briefly the current state of the presently accepted chronology of the ancient and medieval history. The chronology is simply an order of historical events in a certain region arranged on the time line. It indicates the time interval between a particular historical even and the present era. Almost all the most fundamental historical conclusions and interpretations depend on the dating of the related events, which makes the chronology the core of the historical knowledge. The most of modern dating methods are based on the comparison of data in a document with those whose datings had been established earlier and are regarded as known and fixed. The dating of ancient events is predominately based on the Roman chronology, which is the "spinal column" of the whole global chronology and history. As a matter of fact, *"all the remaining dates in ancient chronology were determined by means of direct or indirect synchronizations with the Romans ones*[1]*."*

Figure 1.1: *Iosephus Iustus Scaliger (1540–1609)*

Chronology, as we know it today, has been basically established in the 16th and 17th centuries. It was initiated by the fundamental works of Joseph Scaliger (1540–1609) (Iosephus Iustus Scaliger), whom the contemporary chronologist E. Bickerman considers as the "founder of the modern chronology as a science." In his fundamental works *Opus novum de emendatione temporum*, published in 1583 by Lutetiac in Paris, and *Thesaurum temporum*, published in 1606, Scaliger laid the foundations for the chronological science. His work on establishing chronology was concluded by Dionisyus Petavius (1583–1652), who in 1627 published in Paris his famous book *De doctrina temporum*. Later, in the 18th century, Gerhard Frideric Miller (1705-1783), applied Scaliger's schema to "revise" Russian history. We should also mention the chronological works of the 18th-19th century, which are interesting because they reveal how the original chronological research was conducted.

However, the chronologist E. Bickerman points out that *"there is no adequate, full-scale treatment of ancient chronology*[2]*."* Indeed, in spite of the fact that the chronology is far from being complete, there is a clear lack of a modern study, based on strict scientific methods, that could be considered as a substantiation of the correctness of the global chronology of ancient times and the Middle Ages. All kinds of difficulties in processing various original historical material necessitate further such a scientific substantiation of the chronology.

It is appropriate to call the accepted today chronology of the ancient times and the Middle Ages the *Scaliger-Petavius* (or simply the *Scaliger*) version of chronology. This was not the only version of chronology that was considered by the 17th and 18th centuries scientists.

In the 16th and 17th century works by Scaliger and Petavius the ancient chronology was presented in form of tables containing the dates. For many centuries history was dominated by the *church tradition*, so there was *no justification* given for these dates. This is not surprising, since *"for many centuries, history has predominantly been a "church science," and was written, as a rule, by the clergy . . .*[3]*."*

It is assumed today that the foundations of the chronology were established by Eusebius Pamphili and St. Jerome (Hieronymous), presumably in the 4th century A.D. Although, according to Scaliger's history, Eusebius lived around the years 240–340 A.D., his work "*History form the Creation until the Oecumenical Council of Nicaea*" (*Eusebii Pamphili Chronicorum*) was discovered only in the late Middle Ages. Moreover, only fragments of the Greek original of the Eusebius' work survived, — they were completed by the free Latin translation made by St. Jerome. It is also interesting that Nicephorus Callistus made an attempt in the 14th century to write a new history of the first three centuries, but he *"could do noting more than repeat what Eusebius had already said*[4]*."*. Nevertheless, the Eusebius' work was published only in 1544, which was much later than that of Nicephorus. In these circumstances it is possible that, in fact, it was Eusebius who based his work on Nichephorus Callistus. Beginning with Eusebius and Jerome almost all the chronologists until the 16th-17th century belonged to the high ranked clergy (archbishop Jerome, bishop Theophilus, archbishop J. Ussher, etc.) or were closely associated with the Catholic Church (theologian J. Scaliger, Jesuit Dionysus Petavius). They had absolute trust in the infallibility of the ecclesial chronology and excluded the very possibility of criticizing its foundations. For example, J. Scaliger did not even hide that running a check on chronological materials of the holy fathers would be considered as heresy. These were the main reasons why their chronological approach was based on the data contained in the Bible and depended on the Catholic Church authorities. As a result of these cabalistic speculations, the "basic dates" were established for the entire ancient chronology. One of these "basic dates" was the date of the creation of the world. According to the chronolog J. Ussher (Usserius), the world was created early in the morning of October 23, 4004 B.C.[5] The "secular chronology," which appeared later, was also completely based on the church dogma:

[1] See [67], page 77
[2] See [67], p. 96, Note 1.
[3] See [128], p. 105.
[4] See [127], p. xi.
[5] See [129].

"... the Christian chronographers put secular chronography into the service of sacred history ... Jerome's compilation became the standard of chronological knowledge in the West ..."

"J. Scaliger, the founder of modern chronological science, aimed at reconstructing the work of Eusebius ... The dating of Eusebius, often transmitted incorrectly in manuscripts, are of little use to us today ..."[6]

Ambiguities and speculative character of these cabalistic calculations of the "date of the creation of the world" resulted in a wide range of postulated dates. Let us list some of them[7] as an example:

5969 B.C. — the Antiochian dating according to Theophilus;
5872 B.C. — Septuagint date also called the "dating of the seventy interpreters"
5551 B.C. — St. Augustine's date
5515 B.C. — the Theophilus' date, also 5507 B.C.
5508 B.C. — the Byzantine date also known as "the Constantinopol version"
5500 B.C. — according to Hippolytus and Sextus Julius Africanus
5493 B.C. — the Alexandrian date, the Annian era, also 5472 B.C or 5624 B.C.
5199 B.C. — according to Eusebius of Caesarea
4700 B.C. — the Samaritan date
4004 B.C. — according to Ussher, the Hebrew date
3941 B.C. — according to Hieronymus
3761 B.C. — Jewish date

The above examples are just a small fraction of all the existing dates of the "creation of the world,"or the so-called "Genesis date." There are about 200 such dates. Notice the substantial differences between these dates reaching up to 2200 years (2208 years to be more precise). In fact, the choice of the correct "date of Genesis" was not at all artificial. It was crucial for the dating of the majority of documents in which the dates of the described events were indicated in years since the "creation of the world" without indicating, however, which "creation" they actually mean. Since there are many possible variants to choose from, the resulting from it discrepancies in dating of these documents could reach up to 2200 years. The Catholic and Protestant Church sanctioned approval of the "date of creation" prevented up to the 18th century any critical revision or analysis of the ancient chronology.

J. Scaliger and D. Petavius were the first to use the astronomical methods for the confirmation of the late medieval version of the chronology. However, these methods were not applied for its critical analysis or verifications. Nevertheless, for many contemporary commentators this gives sufficient reasons to consider the Scaliger version of chronology as built on a "scientific" basis. In this way the chronology of the Catholic Church suddenly became "scientific." There are not many people who know that Scaliger and Petavius achieved the highest levels of "perfection" in their "absolutely precise" dating of all the principal historical events: they quoted the year, month, day, and even the time of day for these events. Strangely, the modern textbooks usually quote the years according to Scaliger-Petavius, conveniently omitting the month, day and hour.

This shade of "scientific approach," which was supported strongly by the Church and political authorities, gave to the 17th- and 18th-century chronologists sufficient pretext to regard this version of chronology as completely reliable. The chronological dates were further rigidified and supported by unquestioning belief in their correctness. By the 19th century, the chronological data had expanded so much that it caused *a priori* respect by its very existence only. Chronologists, didn't perceive any need for its revision and were only able to make small insignificant changes into the chronology of ancient times. In the 20th century, the problem of establishing the chronology was basically regarded as solved. Chronology has been portrayed to be unchanged in its form that surfaced from the "scriptures" of Eusebius, Jerome, Theophilus, Augustine, Hippolytus, Clement of Alexandria, Ussher, Scaliger, and Petavius. For a historian of the 20th century, the very thought that there could be a chronological mistake seemed to be a complete absurd. Such an idea would contradict the accepted "tradition" and the cultural knowledge absorbed since childhood.

Nevertheless, in the 17th–19th centuries it was discovered that there exist serious contradictions between various chronological data sources and the established traditional chronology. For example, it was discovered that Jerome had made an error of one hundred years[8].

There are essential discrepancies between the chronological data of ancient sources and the global chronology, which were discovered in Egyptian chronology, where a number of documents contradicted each other chronologically. For example Herodotus names Cheops as a successor of the Pharaoh Rhampsinitus, what implies that he places them chronologically next to each other. Contemporary commentators "correct" Herodotus explaining that he *mixed up* Egyptian chronology. According to this explanation Rhampsinitus (Ramses II) was Pharaoh of the 19th dynasty (1345–1200 B.C.) while Cheops was from the 4th dynasty (2600-2480 B.C.). That means Herodotus made a mistake of 1200 years. There is another example of a "mistake" made by Herodotus: immediately after a pharaoh of the 4th dynasty (ca. 2480 B.C.) he placed a pharaoh of the Ethiopian rule in Egypt (ca. 715 B.C.). In this case the gap is 1 800 years.

Let us point out that the choice of a particular chronological version is not always obvious, which can be illustrated by the rivalry between the supporters of the so-called shorter and longer chronology of Egypt. Opinions among Egyptologists can be very divided. For example, according to Champollion, the coronation of Menes took place in 5867 B.C.; according to Le Sueur – in 5770 B.C.; according to A. Mariette

[6] See [67], pp. 87-88.
[7] See [69], p. 73 for more examples.
[8] See [67], p. 89.

— in 5004 B.C; according to Brugsh — in 4455; according to F. Chabas — in 4000 B.C.; according to E. Mayer — in 3180 B.C.; according to T. Andrzejewski — in 2850 B.C.; according to J. Wilkonson — in 2320 B.C.; and according to E. Palmer — in 2224 B.C., and so on. The difference between the dating of Champollion and that of Palmer is 3 643 years. At the present, a shorter version of Egyptian chronology has been adopted, but it is extremely self-contradictory and it still contains many unsolved problems. It turns out that the dynastic sequences were set arbitrarily and the very ancient age ascribed to these lists contradicts the archaeological data. In fact the basic Egyptian chronology was also based on Christian sources. For example, the list kings compiled by Manethon only survived as quotations made by Christian authors.

Let us point out that the Orthodox Church avoided using the birth of Christ as a chronological reference point, which was one of the reasons of the East-West schism.

1.2 Who were the Critics of Scaliger's Chronology

Questions and doubts regarding the correctness of the presently accepted chronology aren't a recent phenomenon. They were raised as soon as it was first published. In fact, there were also other competing hypothesis indicating a "young age" of the "written history." Let us cite from the Morozov's book [4][9]: *"Professor de Arcilla of Salamanca University published two of his works* Programma Historiae Universalis *and* Divinae Florae Historicae *in the 16th century, where he stated that the whole of ancient history had been forged in the Middle Ages; the same conclusions were reached by the Jesuit historian and archeologist J. Hardouin (1646-1729), who regarded the classical literate as written by the monks of the preening, 16th century A.D. (see his books* Consiliorum Collectio regia maxima, Chronologiae ex nummis antiquis prolusio de mummis Herodiadum, Prolegomena ad censuram vertum scriptorum*). The German Privatdozent Robert Baldauf wrote his book* Historie und Kritik *in 1902-1903, where he asserted on the basis of purely philological argument that not only ancient, but even medieval history was a falsification of the Renaissance and subsequent centuries*[10]*."*

Figure 1.2: *John Hardouin (1646–1729), French scolar, linguist, historian, philosopher, and theologian.*

[9] Translation by O. Efimov taken from [103].

[10] See [4], Vol. 7, p. vii-viii, Introduction.

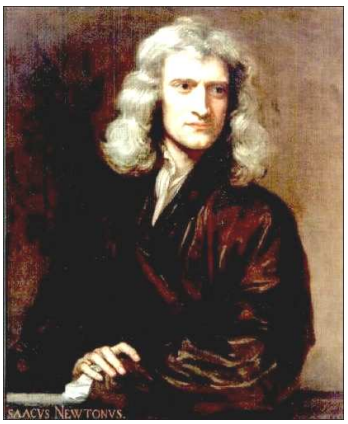

Figure 1.3: *Sir Isaac Newton (1642–1727)*

The famous English mathematician, astronom, physicist and scientist, Sir Isaac Newton (1642–1727) holds a special place among the critics of the Scaliger–Petavius chronology. He is considered to be the culminating figure of the scientific revolution of the 17th century, who discovered a composition of white light, laid foundation of physical optics, established principles of mechanics, formulated the law of universal gravity, and discovered (independently of G. Leibnitz) differential and integral calculus. What is less known about Newton that he was also an author of serious works devoted to chronology problem, which led him to a conclusion that several main sections of the Scaliger version of chronology are erroneous. His main contributions to this area were *A Short Chronicle from the First Memory of Things in Europe, to the Conquest of Persia by Alexander the Great* and *The Chronology of Ancient Kingdoms Amended*. By applying scientific approach, I. Newton radically rearranged the ancient chronology. In general, the Newton's chronology was significantly shorter than the Scaliger version, which is commonly accepted today. For example, Newton shifted most of the historical events preceding the epoch of Alexander of Macedonia closer to our times. Nevertheless his revisions the chronology were much less radical than the changes proposed by Nikolai A. Morozov, for whom Scaliger's chronology was sufficiently reliable only from the 6th century A.D. Let us point out that Newton's chronological research was not at all dealing with the Christian era. Basically, he analyzed Egyptian and ancient Greek chronology and probably didn't have enough time to investigate the later epochs.

Unfortunately the enormous work performed by Newton was taken skeptically by his contemporaries. Newton's chronological research is not getting a better treatment from the present-day historians. By comparing his work with Scaliger's chronology they are convinced that Newton was mistaken. They claim that without knowledge of the hieroglyphic or cuneiform writing, or the immense archaeological data (which clearly were not yet available at that time), Newton made large errors in his dating, ranging up to a thousand years.

Let us indicate briefly what were those Newton's "mistakes." For example, according to the presently accepted Egyptian chronology, the coronation of Pharaoh Menes took place in the year 3000 B.C., while Newton estimated that this event happened in the year 946 B.C. — a discrepancy of about 2000 years.

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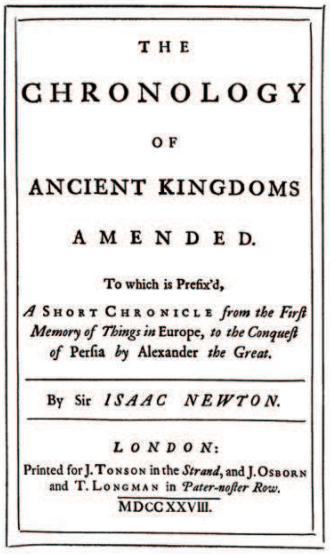
THE
CHRONOLOGY
OF
ANCIENT KINGDOMS
AMENDED.
To which is Prefix'd,
A SHORT CHRONICLE from the First Memory of Things in Europe, to the Conquest of Persia by Alexander the Great.
By Sir ISAAC NEWTON.
LONDON:
Printed for J. TONSON in the Strand, and J. OSBORN and T. LONGMAN in Pater-noster Row.
MDCCXXVIII.

Figure 1.4: *Newton's "The Chronology of Ancient Kingdoms Amended."*

According to Scaliger the famous Trojan war took place in the year 1225 B.C., but Newton's dating of this event was the year 904 B.C — a difference of about 330 years. There are many more similar examples. In resume, Newton claimed that the dates related to the events of Greek history should be shifted forwards by 300 years in average, while the 1000 years period of the Egyptian history, which according to Scaliger, began around the year 3000 B.C., should be squeezed between the year 946 B.C and 617 B.C — an epoch of only 330 years. Some of the ancient Egyptian dates he shifted forward by 1800 years, but his revisions stopped at the year 200 B.C. However, a closer look at Newton's work reveals that he did not completely realized a global nature of the errors in the Scaliger version of chronology. His apparently chaotic observations referred to shifting forward in time of several small historical blocks, but they could not be arranged in a systematic chronological system. In fact, Newton was aware that his chronological work was far from being complete. The first edition of his book *The Chronology of Ancient Kingdoms Amended* appeared in 1725 under the title *Abregé de Chronologie de M. Le Chevalier Newton* (translated to French by M. Feret), but the publication was carried on *without Newton's consent*. Newton announced that he was preparing a more detailed book on the ancient chronology, but his death in 1727 interrupted his work on that project. One year after his death, the manuscript of *Short Chronicle*, which still remained unfinished, and his book *The Chronology of Ancient Kingdoms Amended* were published in one volume by J. Tonson.[11]

English scientist Edwin Johnson (1842–1901) presented very interesting critical analysis of the ancient and medieval history, which was published in his books. His main conclusion can be stated as: *we are much closer in time to the epoch of the ancient Greeks and Romans than its written in the chronological tables* (see [174]). He also called for a total revision of the whole antique and medieval chronology.

Nikolai A. Morozov (1854–1946) was a famous Russian scientist, encyclopedist and revolutionary. His investigation of the chronology was based on solid scientific methods, some of them were completely new and innovative. Practically, he restored the scientific character of the chronological reseach. It is not possible to ignore his arguments against Scaliger's chronology.

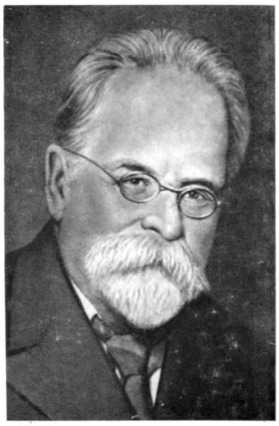

Figure 1.5: *Nikolai A. Morozov (1854–1946)*

Morozov's father – Peter Alekseevich Shepochkin — was a reach Russian nobel belonging to an old aristrocratic family whose relatives were the decendants of Peter the Great. His mother — Anna Vasilevna Morozova — was a simple peasant. They were married before the civil authority but not in the Church, so their children carried the mother's name instead of the father's. At the age of twenty, N.A. Morozov joined the revolutionary movment, what in 1881 led to his imprisonment in the infamous Schlisselburg fortress. During his incarceration he studied chemistry, physics, astronomy, mathematics and history. In 1905 he finally regained his freedom. He spent 25 years in prison. After his release, he devoted himself to scientific research and educational activities. During the years following the Russian Revolution, he became the director of the PF. Lesgaft Institute for Natural Sciences, where he acomplished the most important part of his cientific research on the chronology. His results were first presented to a small group of enthusiastic workers in the Lesgaft Institute. In 1922, he was nominated a member of the Russian Academy of Science, and in 1925 he received the highest Soviet decorations.

Figure 1.6: *Morozov's family house in the town Borke Yaroslavskoi. Presently it is a museum dedicated to Morozov.*

His first publication related to the chronology problem was his book *Revelations in Storm and Thunders*, where he analyzed the dating of the Book of Apocalypse from the New Testament. His conclusions contradicted Scaliger's chronology. In 1914 appeared his book *Prophets*, in which he used the astronomical methods to revise the Scaliger dating of the biblical prophecies. Between the years 1924 and 1932, N.A. Morozov published his fundamental seven volume works entitled *Christ: the History of Human Culture from the Standpoint of the Natural Sciences*[12] — an elaborated and detailed presentation of his critical analysis of Scaliger's chronology. He arrived to

[11] See [?].

[12] See [1].

the conclusion that the conceptual framework of Scaliger's chronology is completely groudless.

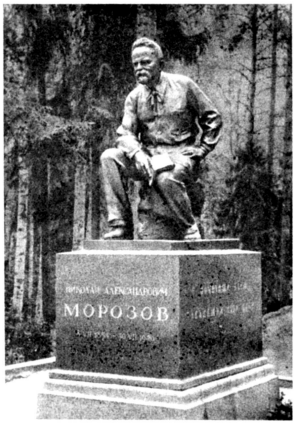

Figure 1.7: *Morozov's monument.*

After analyzing a immense amount of historical material, Morozov formulated his primary hypothesis that Scaliger's ancient chronology was artificially expanded in time and made much longer than it was in reality. This claim was made based on discovered by him "repetitions," i.e. the historical texts, which most probably describe the same sequences of events, but are dated differently and are considered to be unrelated. The publication of Morozov's works created vivid discussion in press, repercussions of which are still noticable in the contemporary literature. There were some reasonable responses to Morozov's arguments, but they were not sufficient to dismiss the entire critical content of his books.

Figure 1.8: *Morozov's parents*

It looks as if N.A. Morozov was completely unaware of the chronological research published by I. Newton and E. Jonhson, which at that time were practically forgoten. Surprisingly, many of the obtained by Morozov's conclusions coincide with the claims made by Newton and Jonhson. However, his investigations the problem of chronology were definitely *on the larger scale and more profound* that those of Newton. He extended his analyzis over the period of history up to the 6th century A.D. and included in it the *redating of all the cornerstone historical events*. Dispite the extensive nature of his work, N.A. Morozov, likewise Newton, was not able to establish any kind of systematic method for the seemingly chotic redating process. However, his work was done on much higher level than Newton's research. He also clearly understood the need for radical revision not only of the "ancient" but also medieval history. Nevertheless, in his research, Morozov did not move further than the 6th century A.D., believing that the presently accepted chronology of the period from the 6th to 13tyh centuries is more or less true. Later, we will explain that this was a big mistake.

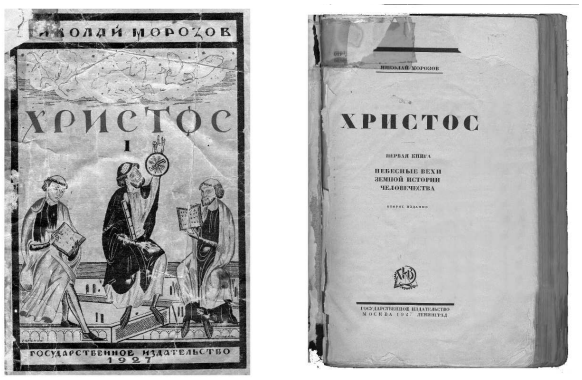

Figure 1.9: *First Edition of the Morozov's book "Christ: the History of Human Culture from the Standpoint of the Natural Sciences."*

The chronology issues appear unwilling to go away, returning persistently and repeatidly, each time with a stronger critical proclamation that there is indeed a problem. The fact that the independent research of such scientists as I. Newton, E. Jonhson and N.A. Morozov had strong similarities in their conclusions indicate that this could be the right direction to look for a solution to the chronology problem.

After the publication of the works by A.T. Fomenko and G.V. Nosovski, dealing with the chronology problem, in 1996 in Germany there appeared several books written by German scientists; Uwe Topper, Heribert Illig, Christian Blöss, and Hans-Ulrich Niemitz. Their authors critically analyzed Scaliger's chronology. For example, the Heribert Illig's book questions the real existence of Charles the Great and presents proofs of an ultimate historical forgery. He claims that the medieval history should be shorten by 300 years by "removing" from it the Charles the Great epoch. Let us point out that the revisions suggested by Illig are of *local character* only, which could be done within the frames of Scaliger's chronology. In another book by Gunnar Heinsohn in Heribert Illig *When the Pharaohs lived?* (see [176]) the authors question the correctness of Scaliger's chronology of the ancient Egypt. Apparently, the authors are not aware of the Morozov's research (see [4]) on the Egyptian chronology, in which he indicated several "glued up" dynastical sequences of Egyptian kings. The Morozov's arguments, which were published in years 1924–1932, supporting drastical shortening of the Egyptian chronology, were never translated to English or German (except for the book *Revelations in Storm and Thunders*).

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We would like to point out a very interesting book by Christian Blöss and Hans-Ulrich Niemitz with an intriguing title *C14-Crash*, in which the authors present numerous testimonies putting in doubt the very possibility of using the carbon-14 method for dating of historical objects. This method, which was discovered by Willard Libby, is based on the measurement of the radiocarbon level in organic samples. The authors also questioned the effectivness of the method of dendrochronology for the purpose of historical dating (see [177]).

1.3 Questionable Authenticity of the Fundamental "Ancient" Manuscripts

In modern historiography there is an astonishing lack of information describing the circumstances in which the ancient manuscripts were discovered. The overwhelming majority of these documents appeared only after the "dark ages," in the epoch of the Renaissance, in an environment that wasn't hepful to a critical analysis of their datings. Let us mention two 19th century renowned historians P. Hochart and J. Ross who published, in the years 1882–1885 and 1878 respectively, their findings about the "ancient" manuscript *History of Tacitus Cornelius*. They demonstrated the evidence that this manuscript was actually written by the well-known Italian humanist Poggio Bracciolini[13]. Without entering into a discussion about the authenticity of the *History*, in our opinion, it describes real events that took place not in ancient but in medieval times. This document was most probably a clever fabrication made by Braccioloni. Let us point out that Poggio Bracciolioni had also "discovered" and published the works of Quintilian, Valerius Flaccus, Marcellus, Probus, certain treatises of Cicero, Lucretius, Petronius, Plautus, Tertullian, St. Marcellinus, Calpurnius Siculus, and so forth. His dealings in ancient manuscripts allowed him to accumulate an enormous fortune. The circumstances of his findings and the details related to dating of the manuscripts' have never been made clear.

Figure 1.10: *Poggio Bracciolioni (1380–1459)*

In the 15th century the famous humanists Manuel Chrysolora, Georgius Gemistos Pletho, Bessarion of Nicae, and others arrived to Italy. They were the first to introduce the achievements of the allegedly "ancient" Greeks to the European thought. Almost all the preserved ancient Greek manuscripts came from the Byzantine Empire. Otto Neugebauer writes:

"The majority of manuscripts on which our knowledge of Greek science is hued are Byzantine codices, written between 500 and 1500 years after the lifetime of their authors[14]*."*

According to the conventional history, the all classical "ancient" literature became known only during the time of Renaissance. Unclear origin of these documents and complete lack of any information describing their whereabouts during the preceding epochs, in particular during the so-called "dark ages," make us believe that these texts had been previously nonexistent. Let us give an example. The oldest manuscripts of Cicero's texts, which are also called incomplete recension, are those of the 9th and 10th century. However, the archetype of the incomplete recension is assumed to be "lost long ago"[15]. In the 14th and 15th century, Cicero's works attracted more and more attention, and as it is explained in the

"... it came to the Milan Professor Gasparine Barzizza ... having undertaken in ca. 1420 A.D. the risky business of filling by himself gaps in the 'incomplete recension' to make it consistent. No sooner had he finished the job than a miracle occurred: in the sleepy Italian town of Lodi, a lost manuscript with the complete text of all of Cicero's rhetorical works was found ... Barzizza and his disciples rushed onto the new find, deciphered its ancient script (probably of the 13th century A.D.), and, finally, made a copy which could be read easily. The transcripts were made from this one, and they are the one which make up the 'complete recension.' ... Meanwhile, the incorrigible took place: the archetype of the recension. i.e. the Lodi manuscript, turned out to be neglected; nobody wanted to rack his brains over its difficult text; it was sent back to Lodi and lost there forever; since A.D. 1428, nothing be been known about its fate. The European philologists deplore the loss even today[16]*."*

Coincidently, the name "Cicero" (or "Zizzero") seems to be an anagram of "Barzizza."

Another example is that of Suetonius' *De vita Caesarum* (*Lives of the Caesars*), which is only available in much later transcripts. The original of the only "antique manuscript" was allegedly possessed by the Frankish historian Einhard, who is also known as the author of *Vita Karoli Magni* (*Life of Charles the Great*). It is believed that Ernhard in *ca.* A.D. 818 carefully reproduced the assumingly biographical stories of Suetonius[17]. This oldest manuscript of Suetonius, which is supposed to be that of the 9th century, became known only in the 16th century, while the other copies are dated not earlier than the 11th century.

The basis for dating of the "ancient" manuscripts, which was accomplished during the 14th–16th century, remains till this day a mystery. For instance, the book of the Roman architect and engineer Marcus Vitruvius' — *De architectura*, was discovered only in 1497. It is amazing that in the as-

[13] See [144] and [145].

[14] See [143], p. 57.

[15] See [148].

[16] See [148], pp. 387-388.

[17] See [149].

tronomical part of his book, Vitruvius lists the precise sidereal periods of the major planets[18]. It seems that Vitruvius, who allegedly lived in the 1st–2nd century A.D., had a better knowledge of astronomy than Copernicus. His period of Saturn differs from the today's known value by only 0.0007, for Mars the error is only 0.006, while for Jupiter his error is 0.003[19]. Let us point out that there are strong parallels connecting Vitruvius' book to Leon Battista Alberti (1404–1472) — Italian Humanist, architect, and principal initiator of Renaissance art theory[20]. By the way, since the letters "v" and "b" were frequently assimilated, there is even connetion between the names: Alb(v)erti– Vitruvius.) Like Vitruvius, Alberti became famous as the greatest Italian architect of his time. He is also the author of an architectural theory which is comparable, in smallest details, to a similar theory of Vitruvius[21]. Just like Vitruvius he was also educated in mathematics, optics, and mechanics. For a long time it is well known to specialists that some pasages of Alberti's and Vitruvius' works coincide *verbatim*!). This strange coincidence is explain today by the assumption that Alberti modelled his own treatise on Vitruvius' work[22].

Thus, we can state with confidence that the book of Vitruvius (as well as that of Alberti) fit perfectly the ideological atmosphere the 15th century. In fact the overwhelming majority of the designed Alberti buildings were in "antique style." So, it appears that the leading architect of the Italian Renaissance fills the cities with antique buildings. Nowadays, they are regarded as "imitations of antiquity," but they could be not at all seen such that in the 15th century. It is possible that the architects of the 14th–15th century did not consider their work as an "imitation of antiquity," but simply created it.

Let us discuss the case of the ancient Greek philosopher Plato, who is assumed to be the founder of the philosophical system — *platonism*. His teachings, initially forgotten, were revived by famous neoplatonist Plotin, allegedly living in 205–270 A.D. As we can expect, the similarities between the names Plato and Plotin are purely coincidental. Then neoplatonism vanishes for many centuries, just to be revived again in the 15th century by another famous platonist — Gemisto Plethon. In this case, the fact that Plethon's name is almost identical to his precursor, is again a sheer coincidence. It was exactly the epoch of Plethon when the manuscripts of Platon were unearthed and it turned out that Gemisto Plathon became an avid advocate of the "ancient" Plato. He founded "Plethon's Academy" in Florence in the image of the "ancient" Plato's Academy, writes his own *Utopia* and a treatise on the *Laws*, which he was unable to complete. So many coincidences in this story give us reasons to question the real identity of Plato.

[18] See [4], Vol. 4, p. 624.
[19] See [4], Vol. 4, pp. 625-626
[20] See [149].
[21] See [149].
[22] See [149].

The oldest biography of Aristotle — "ancient" Greek philosopher and scientist, is dated 1300 A.D., while presubably, "the best Greek codices of Aristotle's works belong to the 10–12 centuries." It is interesting that the "ancient" argument between Plato and Aristotle was "reenacted" in the 15th century, when Plethon and Scholarius — a devoted follower of Aristotle, engaged in a very similar debate. It seems that ancient events were duplicated in the medieval times.

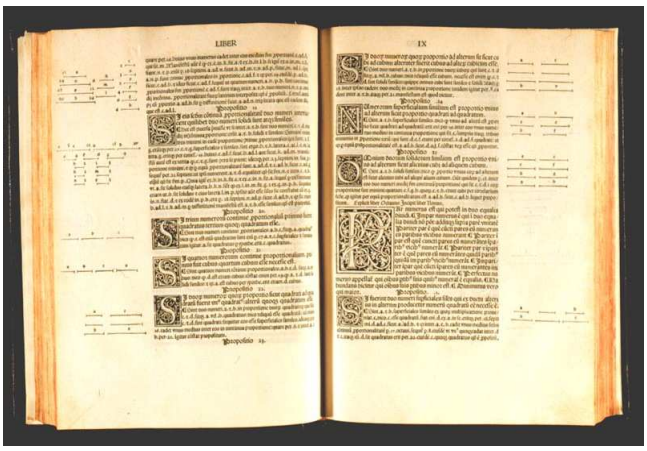

Figure 1.11: *The first edition of Euclid's Elements from the year 1533.*

There are more examples of this kind. For instant, the most ancient manuscript of the *Elements* by Euclid is a copy believed to be made in A.D. 888. All the modern editions of Archimedes works are based on a lost manuscript of the 15th century and the so-called Constantinople palimpsest found only in 1907. It is assumed that the mauscripts with Archimedes workes appeared in Europe after 1204. The *Conics* of Apollonius were published only in 1537, after the death of Johann Kepler who discovered the importance of these curves. The algebraic methods of Diophantus were used by European scientists long before the publication of these works.

1.4 Medieval Anachronisms and Measuring Time in the Middle Ages

In the Middle Ages recording dates and keeping truck of the time was different than tody. E. Bickerman deplors "the chaos of medieval datings.[23]" The analysis of ancient documents also shows that the medieval ideas of time were different than we have today. In the epochs preceding the invention of the clock, time was regarded as "anthropomorphic" and the passing of time was believed to depend on the character of the events. For example,

[23] See [67], p. 78

"... the same time intervals which are used for measuring earth ... time acquire quite a different duration. ... When used to measure biblical events ... Augustine equalized each day of the Creation to a millenium and attempted to determine the duration of the history of mankind. ...[24]*."*

In the 13th and 14th centuries, devices for measuring time were very rare and expensive.[25]

"The sundial ... sandpiece and clepsydra were common in medieval Europe, with the sundial being suitable only when it is fine, and the clepsydra remaining a rarity[26]*."*

In the 9th century candles were commonly used to measure the time. For instance, the king Alfred of England used candles of equal length when travelling[27]. The same methods were still employed even in the 13th and 14th century, for example, during the reign of Charles V.

It is generally known that a devise for a precise time measuring is required for astronomical observations and it is clearly not sufficient to read psalms or sacred books (like it is claimed in [128] p. 94) in order to determine the elapsed time. In fact a clock with the second hand was required for exact astronomical observations. The mechanical clocks which were used widely in Europe did not have minute hand for a very long time. Otto Spengler in his *The Decline of the West* claimed that the mechanical clock was invented around the year 1000 by A. Gerbert. However, this assertion was questioned by A.Ya. Gurevich who maintained that Gerbert only constructed an improved clepsydra. Gurevich also writes

"... the mechanical clock was invented at the end of the 13th century A.D.[28]*."*

By the way, it is commonly believed that the Chinese astronomy achieved very high levels of sophistication thousand years B.C., while there is no evidence that time measuring devises were usedf for these purposes. In fact, there are some records showing that the Chinese rulers were not interested in such European inventions, like mechanical clocks, which were considered just as funny toys rather than a precise time piece![29]

Anachronisms appearing in the medieval historiography provide us with very interesting information. For example, A.Y. Gurevich writes that[30] *"The past is represented in terms of the same categories as in modern times. ... The biblical and ancient historical figures are wearing medieval costumes. ... Depicting kings and patriarchs of the Old Testament with ancient sages and evangelical personages side by side on cathedral portals discloses the anahronistic attitude toward history best of all. ... The crusaders were convinced at the end of the 11th century that they castigated not the descendants of the Saviour's murderes, but the murderers themselves ..."*

These anachronisms are explained by the modern historians that in the Middle Ages "epochs and notions were mixed up" on a very large scale, and that the medieval authors identified ancient biblical times with the Middle Ages only because of their "ignorance." Let us stress out that this allegedly inexplicable "love for anachronisms" can be explained from another point of view. It is possible that all these statements of medieval authors, which seem strange now, are authentic and are regarded as "anachronisms" only because we follow another chronology.

The Scaliger version of chronology was not unique. In fact it is only one of many other medieval chronological concepts. Along with the traditional chronology adopted today, there were other chronlogical versions as well. For instant, the Holy Roman Empire of the l0th–l3th centuries was considered as the immediate successor of the Roman Empire, which, according to Scaliger's chronology occurred in the 6th century A.D.[31]. There are also some traces of a very strange medieval controversy (from the modern point of view): Petrarch, assumingly basing his claims on a series of philological and psychological observations, questioned the authenticity of the privileges given by Caesar and Nero to the Austrian duchy (in the 13th century).[32]. For a modern historian, the very idea that Caesar and Nero were contemporaries of the Austrian duchy who began ruling only in A.D. 1273, i.e., 1200 years later, is absurd. But in the 14th century, Petrarch's opponents were not so sure about it and thought that a "proper proof" was needed.[33].") Another example is the famous gladiator fights that supposedly took place only in "the ancient past." But this is not so obvious. According to V.I. Klassovsky they also occurred in the 14th-century[34] — in Naples, in the year 1344.[35]. As in antiquity, thee medieval fights ended in the death of a fighter[36].

1.5 The Chronology of the Biblical Manuscripts

The chronology the biblical books and their process of dating are difficult to be determined and we are supposed to rely in this respect on the authority of the Christian theologians of the late Middle Ages.

The contemporary researcher of Christianity — I.A. Kryvelev[37] writes the following: *"The real story behind the origins of the books of New Testament is not exactly as it is proclaimed by the Church. ... The presently accepted order of some New Testament books is contrary to the order established*

[24] See [128], pp. 109-110
[25] See [154].
[26] See [128], p. 94.
[27] See [128], p. 95.
[28] See [128], pp. 134-135.
[29] See [155], pp. 80-87.
[30] See [128], pp. 117-118.
[31] See [156], Vol. 1, p. 16
[32] See [156], Vol. 1, p. 32
[33] See [156].
[34] See [159].
[35] See [158], p. 212..
[36] See [158].
[37] See [159], pp. 267-268

by the Church tradition. . . . The real names of authors of the New Testament books remain unknown." The introduced by Anatoly T. Fomenko,[38] modern mathematical and statistical methods of dating, undermine the accepted today view that the Old Testament books precede those of the New Testament. Consequently, these revelations renew interests in a discussion of the ancient orgins of the surviving to our times biblical manuscripts.

"The most ancient of more or less complete surviving copies of the Bible are the Codex Alexandrines, Codex Vaticanus, Codex Sinaiticus. ... All three manuscripts ... are dated (paleographically, i.e., on the basis of comparing the 'handwriting style' of the manuscript with that of other manuscripts whose dating is taken as known — Authors) *. . . by the second half of the 4th century A.D. The language of the Codices is Greek. . . . The lesser known is the Codex Vaticanus; in particular, it is not clear how and when this source appeared in the Vatican around the year 1475. . . . It is known about the Codex Alexandrinus that . . . the patriarch Cyrilles Lucaris presented it as a gift to the king of Great Britain and Ireland, Charles I, in 1628."*[39]. The *Codex Sinaiticus* was discovered only in the 19th century by L. Tischendorf [40]. *Codex Bezae* and *Codex Ephraemi Syri Rescriptus* are of the same sources.

Thus, all these three most ancient codices were actually discovered only after the 15th century and their reputation as being ancient was established on Tischendorf's authority based on his judgment of the "handwriting style." Let us point out, that the idea of paleographic dating assumes that the age of other documents is known *a priori*; hence, this dating method is not independent.

Among the individual biblical manuscripts, the most ancient is the Book of the Prophet Zechariah and that of Malachi, which was paleographically dated to the 15th century A.D.[41]. Although in many national libraries one can find numerous copies of Jewish manuscript of the Bible, there is no such manuscript that is dated earlier than the 9th century A.D. However, on the original manuscript the inscripted date is the year 1228. Based on the so-called babilonian punctuation of letters in this manuscript, it is associated with an epoch that supposedly allows to translate this as the year 916 A.D. But there are no serious arguments in support of this claim. That means this manuscript could be from the 13th century instead of the 9th.

The most ancient Jewish manuscript of the complete text of the Old Testament is referred only to the year 1008 A.D.[42].

It is assumed that the biblical Canon was established by the synod at Laodicea in A.D. 363, but no acts of this and earlier synods survived[43]. In reality, the Canon was officially established only since the new Council of Trent had assembled in 1545 and lasted, with intervals, until 1563 (during the Reformation). By the order of the Council, many books were regarded apocryphal, in particular, the *Book of the Kings of Judah and Israel*[44].

By the decree of the Council of Trent a large number of books, considered uncanonical, were distroyed. Among them was the "*Chronicle of the Jewish and Israeli Kings*." These books and their contents are *lost forever*. Let us point out that there were more apocryphal books than those consider as canonical.

The most dating of biblical manuscripts are based on paleography, which depends completely on Scaliger's chronology assumed to be known *a priori*. In the case another version of chronology is adopted, all the "paleographic datings" would be automatically changed.

Let us present few examples. *"In 1902, the Englishman Nash bought in Egypt a fragment of a Jewish manuscript written on a papyrus, the dating of which the scientists cannot agree upon until today*[45]*."* Finally, it was agreed that the text referred to the turn of our millennium. *". . . after the Qumran manuscripts had been discovered, the comparison of the 'handwriting' on the Nash papyrus and the Qumran scrolls made it possible to establish at once that the latter were quite old*[46]*."* In is way, one scrap of the papyrus, whose dating we not "agreed upon by everyone," influenced the dating of all the other documents. Nevertheless,

"... dating the manuscripts (of Qumran–Authors) *led to much controversy among the scientists (namely, from the 2nd century B.C. to the time of the crusaders*[47]*."* For example, the American historian S. Zeitlin insists that these texts are of the medieval origin[48]. Let us point out that it is assumed today that the original dating of the Qumran scrolls to the beginning of the millennium was confirmed by the radiocarbon dating method. However, this method is extremely unstable for comparatively small time intervals.

1.6 Vowels in Ancient Manuscripts

There are other basic problems related to reading and dating of the ancient, medieval, biblical, ancient Egyptian, and other manuscripts. J. Sunderland, who investigated the original language of the Old Testament, wrote: *"The thing is that the Jewish written language originally had neither vowels nor signs replacing them. The books of the Old Testament were written only with consonants*[49]*."*

Old Egyptian texts were also written in consonants only. E. Bickerman writes that *". . . the names of Egyptian kings*

[38] See [103].
[39] See [159], p. 270
[40] See [159], pp. 268-270.
[41] See [?]
[42] See [159], p. 270
[43] See [159].
[44] See [160], p. 76.
[45] See [159], p. 273.
[46] See [159], pp. 272-273.
[47] See [160], p. 47.
[48] See [160], p. 27.
[49] See [161], p. 155.

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are given in contemporary literature schematically, in a quite arbitrary, so-called scholastic manner adopted in school textbooks. These forms are often, greatly different from each other; it is impossible to order them somehow, due to their arbitrary reading which became traditional[50]*."*

Probably, the high cost of writing materials in ancient times was the reason for omitting the vowels in the manuscript and thereby essentially shortening the text. Writing the words without intervals between them was possibly another way of saving the space for the same purpose.

However, if we take a today's Jewish Bible, we shall find there all the missing vowels. These signs did not belong to the old Jewish Bible. The original text was read by consonants, and the intervals were filled with vowels according to one's skill and the apparent requirements of the context.[51]. Notice that the exact meaning of a word written in consonants only was extremely ambiguous. For example, *CLN* could mean *clean*, *clan*, *colon*, and so forth!

According to T. Curtis, even for the priests, the old manuscripts remained extremely unclear and were understood only with based on the authority of the legend[52]. It is assumed that this serious shortcoming of the Jewish Bible had been eliminated not earlier than the 7th or 8th century A.D., when the Massoretes revised the Bible and added signs replacing the vowels. It was done with no rules or a specific system, except their own reason, and a very imperfect legendary tradition[53]. S. Driver points out that, since the times of the Massoretes in the 7th-8th century A.D., the Jews have taken great care in keeping their sacred books, but then it was too late to repair the damage already done. Consequently, the distortions were placed on exactly the same level of authority as the original text[54].

It was commonly believed in the earlier epochs that the vowels had been introduced into the Jewish text by Ezra in the 5th century B.C. However, in the 16th and 17th century, E. Levita and J. Capellus proved that the vowels had been introduced only by the Massoretes, what created at that time a sensation in the whole of Protestant Europe. Many people expected that, since the vowels were not coming from Divine Revelation, but were results of human intervention, the new theory would lead to disproving the religion completely. Moreover, because of these much later alternations, how one could rely on the text of the Scripture? This discussion was one of the passionate in the history of the new biblical criticism and continued for more than a century. It stopped only when the validity of the new pespective was acknowledged by common acceptance[55].

[50] See [67], p. 176.
[51] See [161], p. 155.
[52] See [161], p. 155.
[53] See [161], pp. 156-157.
[54] See [161], p. 157.
[55] See [161] , pp. 157-158.

1.7 Controversy over the Ptolemy's *Almagest*

The details related to the astronomical and mathematical analysis of the Almagest were published in the book by A.T. Fomenko, V.V. Kalashnikov and G.V. Nosovsky "*Geometrical and Statistical Methods of Analysis of Star configurations. Dating Ptolemy's Almagest*"[56]

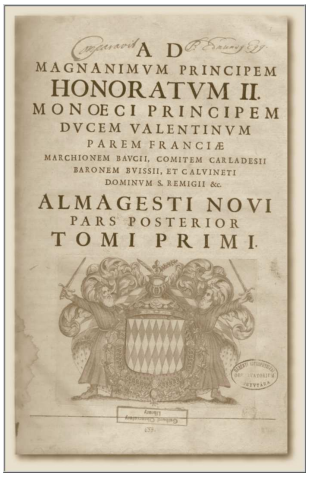

Figure 1.12: *Ptolemy's "Almagest"*

It is traditionally assumed that Claudius Ptolemy was an Egyptian astronomer, mathematician, and geographer of Greek descent who worked in Alexandria during the 2nd century AD. His major astronomical work, the star catalogue — the *Almagest* contains the records of Ptolemy's astronomical observations. The *Almagest* was supposedly completed around the year 150 A.D. Ptolemy and Hipparchus (living presumably in the 2nd century A.D.) are considered to be the founders of the astronomical science. The *Almagest*, whose original name was *Mathematike Syntaxis* ("*The Mathematical Arrangement* — *Almagest* is an Arabic corruption of the Greek word *megiste* for *greatest*), is regarded as the most precious and immortal treasure of the ancient sciences. It contains observational data of more than 1000 stars, elabortated numerical tables that could be used for calculations of the planetary positions on arbitrary dates, and it describes a unified geocentric cosmological system that is assumed to have a profound influence on the medieval astronomy.

1.7.1 Coordinate System used in the *Almagest*

The state of preservation of the *Almagest* is extraordinary, and it seems that in spite that it had been rewritten many times since the 2nd century, its observational data shows inexplicable accuracy. Notice that it is natural to expect that numerous typographical errors must have been made when the catalogue was copied. It is also strange that the star catalogue uses the spring equinox as the reference point for the measurements of the longitudes, which involved additional difficulties that were sorted out only during the period from the 10th to 16th century. In addition, Ptolemy chose the North Star as the first star of the catalogue, what was not substantiated by the astronomical observations in the 2nd century. At that time there was another star near the north galactic pole, but this choice is consistent with the observations that could be made in the 11th–16th century.

[56] See [106].

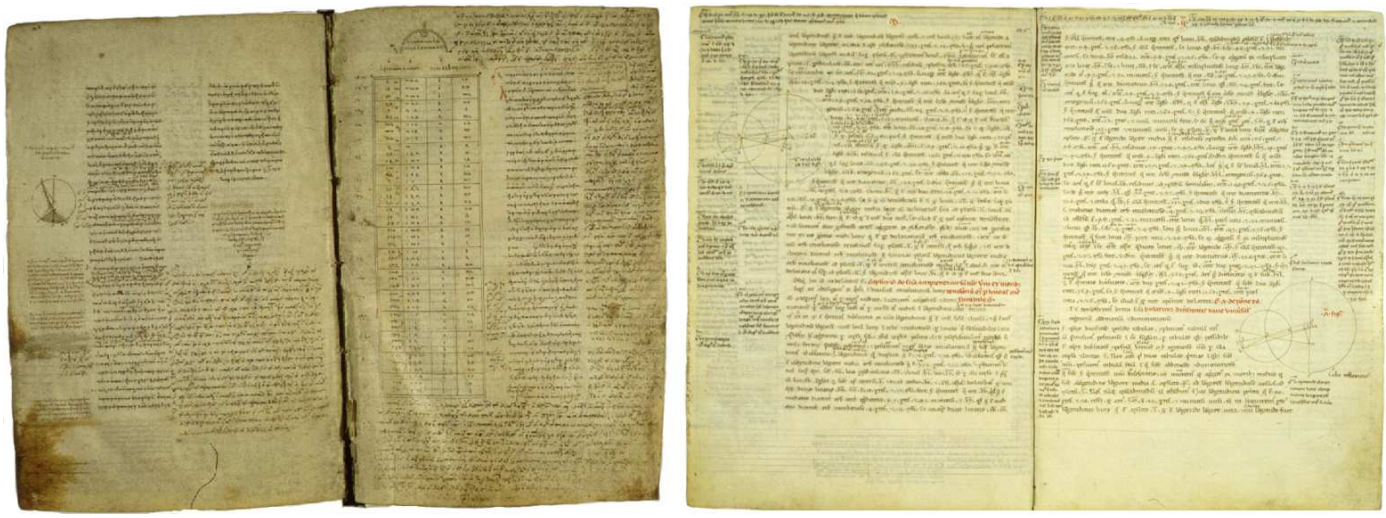

Figure 1.13: *Ptolemy's tables and computations in "Almagest"*

Let us point out that Ptolemy adopted in the *Almagest* the so-called ecliptical coordinate system, which was believed by the medieval astronomers to be *perpetual*, i.e. it was assumed that the ecliptical latitudes of stars were not subjected to any change in time, while the longitudes were increasing steadily, what was caused by the cyclic precession of the Earth's axis of rotation. However, the systematic and considerable latitudinal shift was discovered by the astronomer J. Bode (1747-1826), which puts the *Almagest's* traditional dating in doubt.

Let us point out that in the Middle Ages two star coordinate systems were known, namely, the ecliptical and equatorial systems. Beginning in the 17th century, only the equatorial coordinates have been used in astronomical catalogues. Ecliptical coordinates can only be found in the *Almagest* and it the 16th century catalogues, for example the star catalogue of Tycho Brahe (1546–1601). The reason for this is very simple — the equatorial coordinates are much easier to measure than the ecliptacal ones. At the time of Ptolemy and in the 15th–17th century period, astronomers believed that the ecliptical coordinates are "eternal," what turned out to be wrong. Ptolemy also believed that stars do not posssess their own movements and that their configurations on the sky are invariable. But this claim also was not correct. In the mid-18th century it was discovered that the star Arcturus changes its position by 1^o each 100 years (this value was later corrected to 1.4^o).

Ptolemy declared in the *Almagest* that he had directly measured the ecliptical coordinates of all stars (more than 1000 of them) using an astrolabe, which is rather complicated procedure. He also described the magnitude of stars using the integer scale from one (for the brightest stars) to six (for the faintest ones). If we compare the magnitudes 1 to 2 of Ptolemy's stars with bthe modern ones, we shall conclude that they were always determined correctly, while he often made mistakes in the interval of the magnitudes 3 to 6.

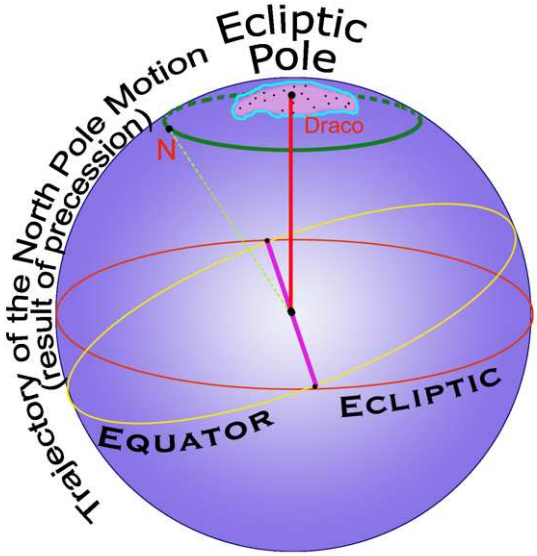

Figure 1.14: *Precession of the Earth's North Pole*

There are dozens of contemporary works devoted to dating of the *Almagest*. N.A. Morozov, for example, used the following simple method to determine the date of complilation of the *Almagest* star catalogue. Since we know that the stars' longitudes possess an annual precession of $50.2''$, therefore, if we divide the difference between today's longitudes and those listed by Ptolemy in the *Almagest*, we will be able to derive the date when the catalogue was compiled. The obtained by Morozov results were shocking: all the longutues given in the first Latin edition indicated the 16th century, i.e. the time when this "ancient" book was published. We would like also to mention a very interesting book by Eglish astronomer Robert Newton *"The Crime of Claudius Ptolemy"*[57], in which

[57] See [178].

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he conducted a mathematical and statistical analysis of the astronomical data contained in the *Almagest*. The results of his research were unexpected. He arrived to the conclusion that the astronomical observations of the *Almagest* were falsified. These serious accusations put in doubt the validity of the *Almagest's* astronomical data for the history of science. By the way, R. Newton was not aware of the results obtained by Morozov and fully trusted Scaliger's chronology.

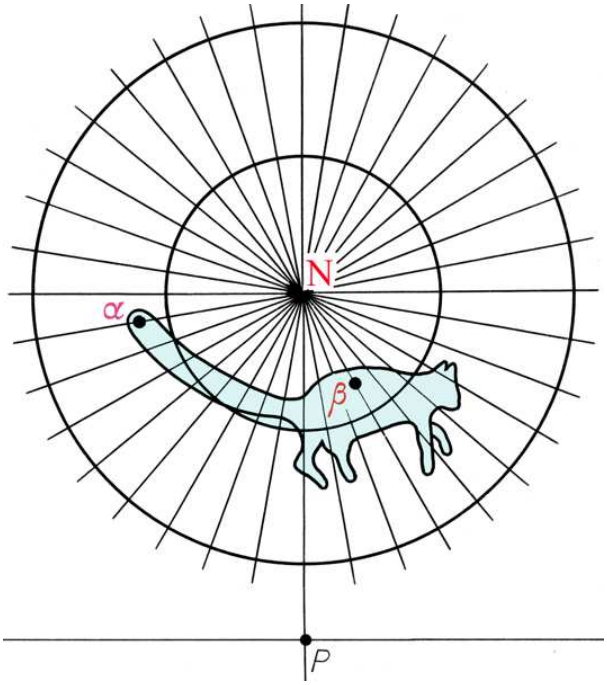

Figure 1.15: *Locations of Alpha Ursae Minoris and Beta Ursae Minoris in the 2nd century A.D. (based on J.E. Bode's drawing).*

1.7.2 North Star as the First Star of the Catalogue *Almagest*

According to Scaliger's chronology, the *Almagest* was compiled in the 2nd century A.D. or even a little earlier than the 2nd century. It is possible to verify that since the last two and half thousand years the closest star constellation to the north galactic pole was Ursa Minor. Then, we can also compute which of the stars in the Ursa Minor constellation was the closest to the north pole in the beginning of the Christian era about two thousand years ago, that means at the time traditionally associated with the creation of the *Almagest*. It turns out, that it was *Beta Ursae Minoris* — the star that is listed in the *Almagest* as a star of second magnitude, while the North Star (*Alpha Ursae Minoris* or Polaris) is indicated there as a star of the 3-rd magnitude. Let us explain that of course it the *Almagest* the modern of Alpha and Beta-convention was not used, and the stars were indicated according to their position in the constellation and the coordinates. In fact, the brightness of the both Alpha and Beta stars in the Ursa Minor constellation are almost identical. Based on the present day measurments, the brightness of Alpha is $M = +2.1$ and of Beta is $M = +2.2$ (see section 6.8 for more information about the brightness scale), which means that Alpha is just slightly brighter than Beta. Nevertheless, Ptolemy mistakenly thought opposite.

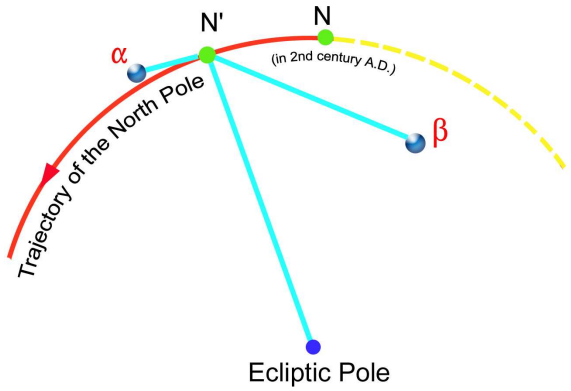

Figure 1.16: *Locations of Alpha Ursae Minoris and Beta Ursae Minoris with respect to the North Pole.*

Moreover, the computations show that in the 2nd century A.D. the distance between Beta Ursae Minoris and the north pole was exactly 8^o, which is exactly the same as the distance between Alpha Ursae Minoris (North Star) and the north pole today. In the 2nd century Alpha was located 12^o from the north pole. That means that it could be clearly noticed that in the 2nd century *North Star was significantly further from the north pole than Beta Ursae Minoris*. The actual configuration of the these stars, as it was observed in the 2nd century, is shown on Figure 1.15 which is based on a chart made by German astronomer Johann E. Bode according to the *Almagest*. As Bode was not concerned with the actual dating of the *Almagest*, his drawing indicates the actual locations the stars in the 2nd century. Notice that, Beta is indicated in the center of Ursa Minor, while Alpha is placed at the very end of the tail of this constellation. This is exactly how the positions of these two stars were described in the *Almagest*: Alpha as "the star at the end of the tail," and Beta as "the most northen star in the back of the constellation."

In our opinion, it would be the most reasonable to start the 2nd century star catalogue with the star Beta rather than Alpha. N.A. Morozov wrote in this respect:

" *"Who possible could have an idea to present a description of constellations in the northen hemisphere beginning with the most distant from the north pole star of the Ursa Minor, which was not even in the center of this constellation but at its very end of the tail."*

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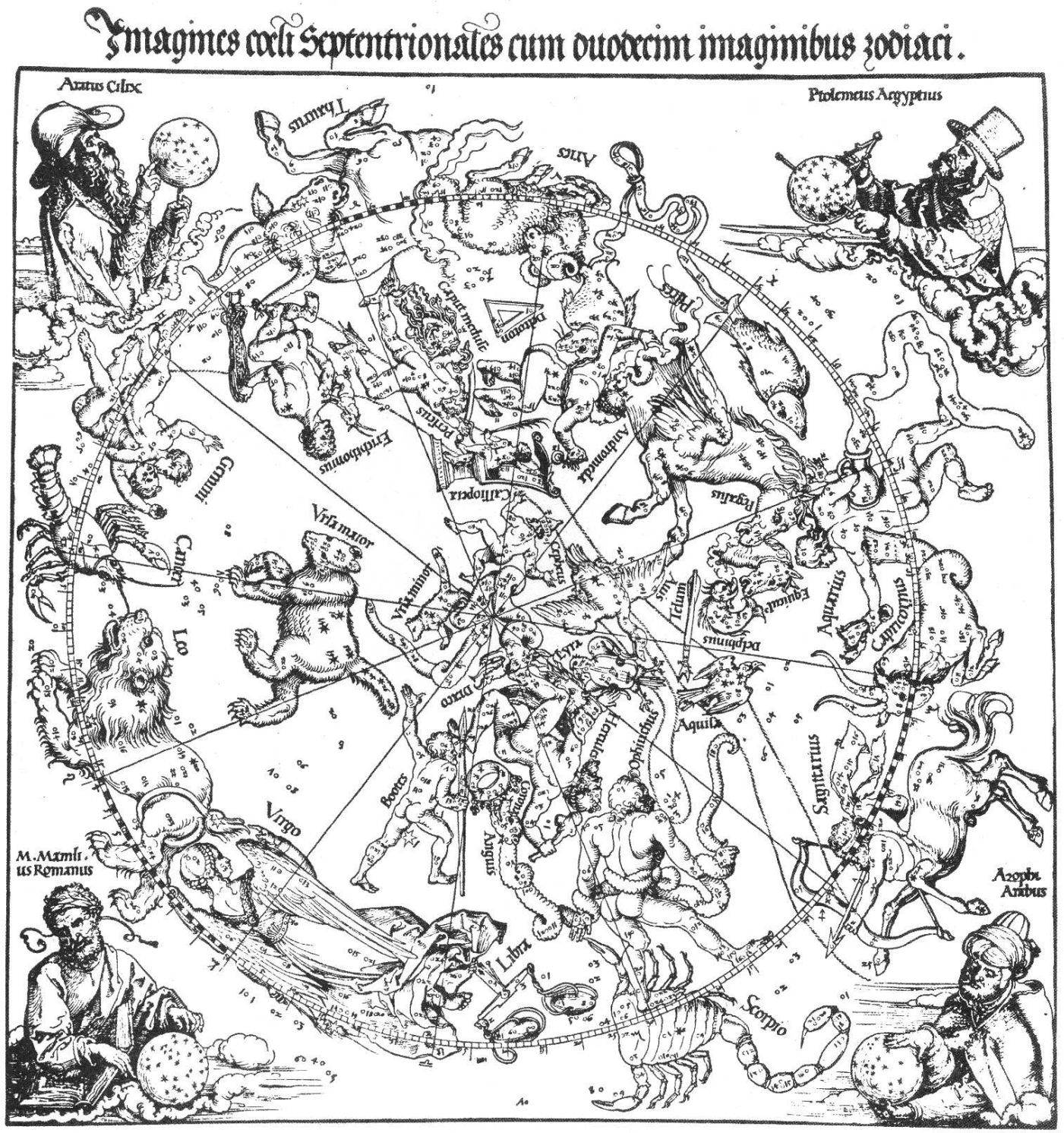

Figure 1.17: *An astronomical chart by A. Durer that was published in the first edition of the Almagest*

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However, all these pecularities disappear when we renounce the hypothesis claiming that the *Almagest* was compiled in the beginning of the Christian era. Let us find out what would be the best epoch in which Northen Star would be the most natural choice for the first star in the catalogue. On Figure 1.16 we show the trajectory of the north pole around the ecliptic pole P, and the locations of the stars Alpha and Beta. It is clear that with the time the astronomical situation was changing: Beta was gradually moving away from the north pole, while Alpha was directly approaching the north pole. We have indicated on Figure 1.16 the initial position N of the north pole in the 2nd century A.D. The angular velocity of the north pole moving around the ecliptic is about 1^o per 100 years. Now we are in the position to find out the epoch when North Star became closer to the northy pole than the star Beta. Since an argument of this type can hardly be considered as reliable for the dating purposes, we are satified with a rough estimate indicating the period from the 9th to 11th century A.D. At that time Alpha was closer to the north pole than Beta and Alpha was also the brightest star of Ursa Minor ($M = +2.1$ for Alpha, while for Beta it was $M = +2.2$). It is also obvious that at that time an observer compiling a star catalogue, would choose the star Alpha as the first star in the Northen Hemisphere. Notice that it is exactly, how the creator of the *Almagest* listed the stars. In addition, during the 15th and 16th centuries, when the publications of the *Almagest* took place, North Star was the closest star to the north pole — its distance was only 4^o from the north pole. Consequently, by chosing North Star as the first star in the catalogue, the creator of the *Almagest revealed the real time of its observations — the epoch that was not earlier than the 9th or 10th century.*

1.7.3 Statistical Analysis of the Star Catalogue *Almagest*

Let us return to the investigation of the *Almagest* conducted by astronomer R. Newton's. It is important to emphesize that Newton never, at any moment, doubted the correctness of Scaliger's chronology. His conclusions can be summarized as follows:

1. The astronomical stitation on the real sky in the beginning of the Christian era *does not match* the astronomical data contained in the *Almagest*;
2. The presently availabe version of the star catalogue *Almagest* does not contain descriptions of direct astronomical observations, but *the results of computations, based on the theoretical models*. These theoretical computations were later inserted into the *Almagest* seemingly to falsely assume the real astronomical observations, i.e. they were (according to Newton) fabricated;
3. The *Almagest* couldn't be compiled around the year 150 A.D., as it is claimed by Scaliger's chronology;
4. Consequently, the *Almagest* was created during another epoch and its dating should be revised accordingly.

R. Newton points out the passages in the *Almagest* indicating that the astronomical observations were conducted during the reign of the Roman emperor Antoninus Pius, who according to Scaliger's chronology ruled from 138 to 161 AD. Therefore, R. Newton concludes, that whoever was the author of the *Almagest*, he was a liar. There is no way his "personnally made observations" could ever represent a real astronomical situation from the 2nd century. In the introduction to his book, Robert Newton stated that it was a story about a crime comitted by a scientist against the ethics in his profession. He claimed that Ptolemy's star catalogue was "corrected" according to the precession used by Hipparchus. For example, he shows that the equinoxes and other observations allegedly made by Ptolemy to determine the ecliptic's slop and Alexandria's latitude, were fabricated. There were also four fabricated lunar eclipse "triads," falsifications of calculations and falsification of data (for example related to Venus and the exterior planet data). Newton completes his thought with a statement that Ptolemy was not an outstanding astronomer of antiquity but rather a most successful swindler in the history of science[58].

However, a perception of the Ptolemy's work may become quite different if it turns out that it was a text written in the 10-16th century. In the book [106], the authors, V.V. Kalashnikov, G.B. Nosovsky and A.T. Fomenko, verified the correctness of R. Newton's calculations and confirmed his findings. In contrast to R. Newton, their goal was to achieve an independent dating of the *Almagest* based on the mathematical and statistical analysis of the individual stars' proper motion. This is not an easy problem, which required a careful analysis of the accuracy of the *Almagest's* star coordinates. Let us recall that every star in the catalogue was identified by two ecliptic coordinates: longitude and latitude. It was discovered that the accuracy of the longitudes was much worse than that of the latitudes, leading to a suspission that they were obtained by a method quite usual in the Middle Ages: by measuring equatorial coordinates and subsequently recarculating them into ecliptical ones. Since the calculations of the ecliptic longitudes were much more complicated, larger errors arose and the accuracy failed, making them useless for the purpose of dating the *Almagest*. In addition, the longitudal precessions were already well known in the Middle Ages, what could have been tempting to manipulate this data. The method used in [106] was applied to latitudes only. Its effectivness was tested on the several star cataloges whose dates are well known (for example the star cataloge of Tycho Brahe, Bonner Durchmusterung, etc.). It involved extensive computations which were done using specially writen for this purpose computer programs.

For the purpose of computations, a list of 80 relatively fast moving stars was compiled, based on the modern star catalogue by D. Hofflit (The Bright Star Catalogue). Based on this list about 35 stars were identified in the *Almagest*, from which three had to be rejected because their identity couldn't be indisputably established. Let us point out that it was not a trivial question to identify some of the stars in the *Almagest*. Basically, the star identifications in [106] confirm

[58] See [178].

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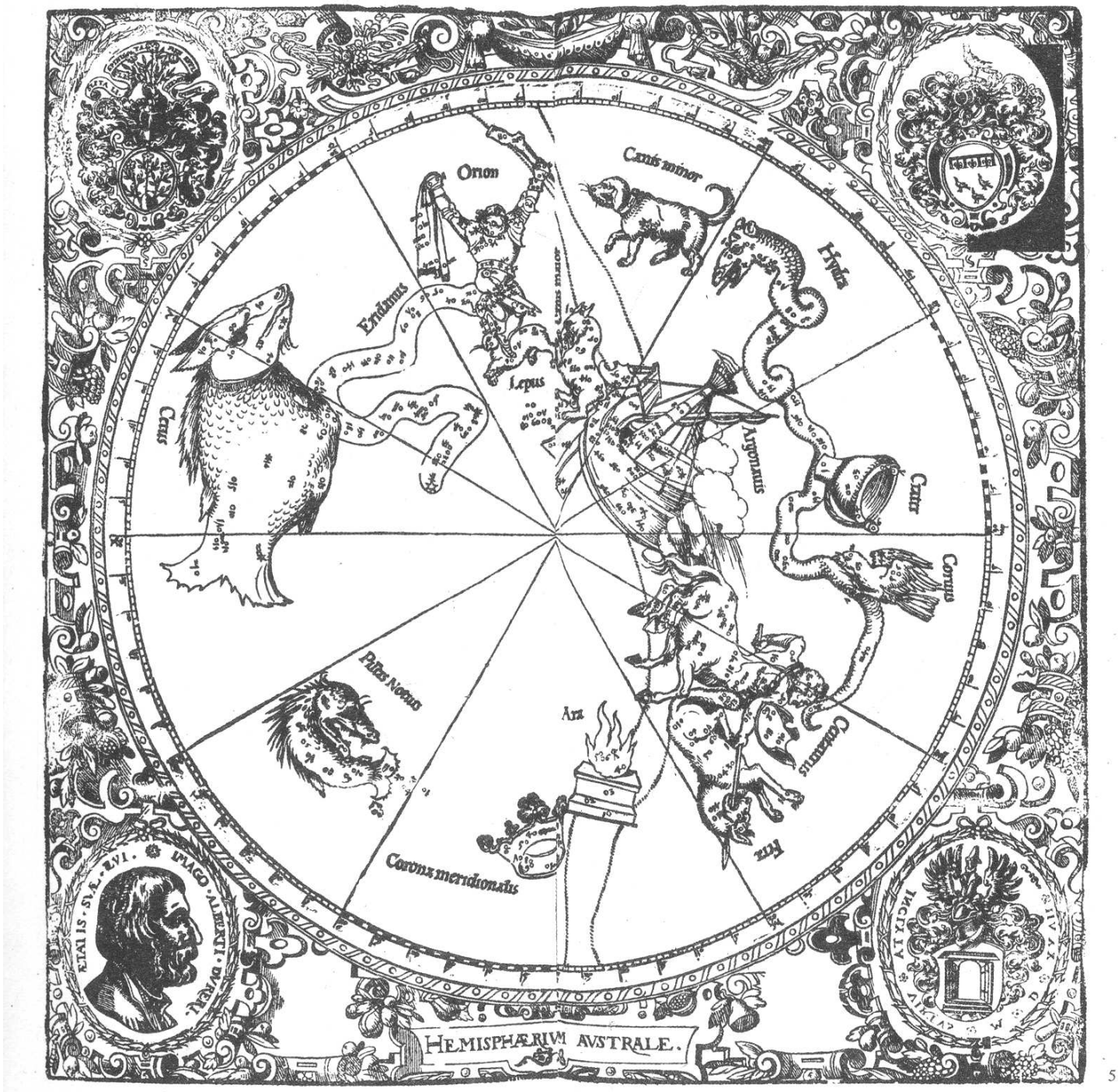

Figure 1.18: *An astronomical chart by A. Durer that was published in the first edition of the Almagest*

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Figure 1.19: *An astronomical chart by A. Durer that was published in the first edition of the Almagest*

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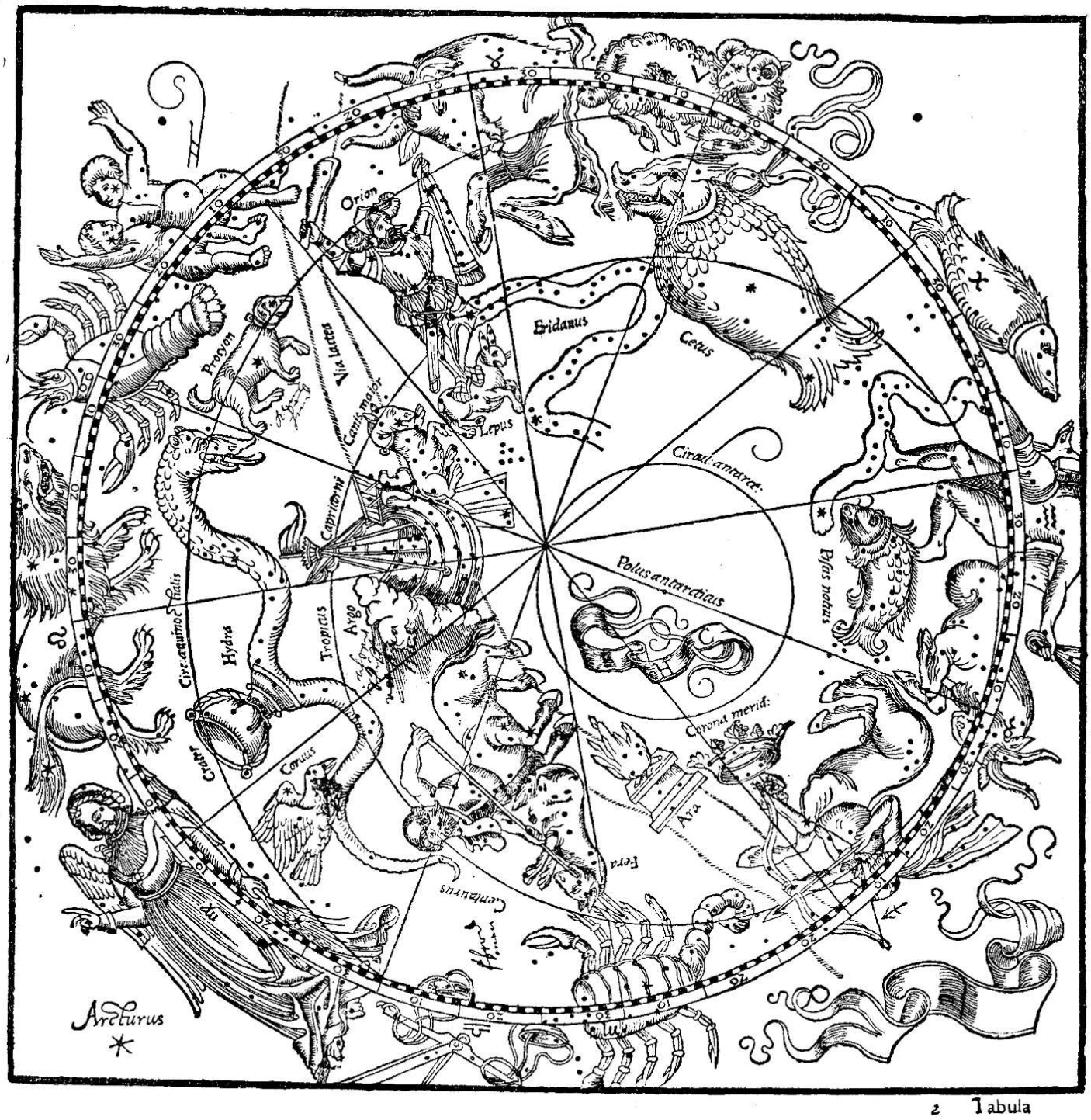

Figure 1.20: *An astronomical chart by A. Durer that was published in the first edition of the Almagest*

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the identifications made by F. Peters and E. Knobel. The idea was to consider, instead of individual stars, the whole collection of the moving stars in order to calculate the date when they were observed on the sky. In this approach the whole collection was considered as a single body moving on the celestial sphere. Let us mention, without entering into the mathematical formalizm behind this computations, that the obtained in [106] results do not confirm the traditional of the *Almagest* but shift its dating to the epoch from 600 to 1300 A.D. This confidence interval coresponds to probability $p = 99.8\%$

1.8 Peculiarities in Development of Ancient Astronomy

According to Scaliger's chronology, the "ancient" astronomy achieved an incredible level of development. It is considered that its peak was reached in the *Almagest* by the last greatest astronome of the antiquity – Claudius Ptolemy. After that, in Scaliger's chronology, the period of profound silence takes place. Arthur Berry, in his *Short History of Astronomy* states thatthe last important name associated with the ancient Greek astronomy was that of Ptolemy.

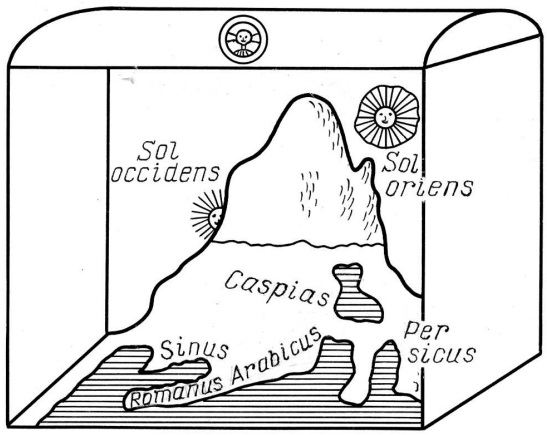

Figure 1.21: *Medieval representation of the Universe.*

The heights of the "ancient" astronomical knowledge were allegedly attained again only by astronomers in the Middle Ages during the epoch of Renaissance. In fact, it is portrayed that in the "antique" world the level of astronomical knowledge was so widespread and of such unbelievable stature that it was demonstrated in quite unscientific ways. For example, a certain "ancient" consul in the Roman army was able to present to his regular soldiers a lecture on the scientific theory of lunar eclipses. In respect to this, that's what Titus Livy writes in his famous *History of Rome*: "*Sulpicius Gallus, a military tribune attached to the second legion, who had been a praetor the year before, obtained the consul's permission to call the soldiers on parade. He then explained that on the following night the moon would lose her light from the second hour to the fourth, and no one must regard this as a portent, because this happened in the natural order of things at stated intervals, and could be known beforehand and predicted. Just in the same way, then, as they did not regard the regular rising and setting of the sun and moon or the changes in the light of the moon from full circle to a thin and waning crescent as a marvel, so they ought not to take its obscuration when it is hidden in the shadow of the earth for a supernatural portent. On the next night - September 4 - the eclipse took place at the stated hour, and the Roman soldiers thought that Gallus possessed almost divine wisdom.*" We are told today, that this detailed explanation about eclipses was given to the soldiers of the Legion of the "ancient" Rome about 2000 years before. For a person familiar with the history of science, this "ancient soldiery lecture" makes a real strong impression. This impression can be even stronger if we take a look at the stage of the astronomical knowledge during the period from the 2nd to 10th century A.D.

After having witnessed the pronouncement of the Roman consul in front of the soldiers of the Legion, let us move forward to the 6th century A.D. and find out what tells us the renowned specialist in the medieval cosmography — Kosma Indikoplevst. What was at that time the knowledge about the Universe, stars and Sun? In his opinion, the Universe was believed to be a "basket" (see a copy of a medieval picture representing the Universe on Figure 1.21). Inside this "basket, from the flat Earth surrounded by the ocean, there was a huge mountain rising up. The Sun and Moon were hiding behind this mountain for a fixed time. The firmament, filled with small nails-stars, was supported by four vertical walls. This "highly competent" perspective of the Universe, quite well illustrates the initial stage, which is clearly very primitive, of knowledge at this epoch. Historians of science following Scaliger's chronology, are forced to call this situation as a "relapse of childhood," explaining that the ideas of the flat Earth, which are usually concieved during the childhood, found thier way to dominate peoples minds.

What's happened? From where did this cave-man like understanding of astronomy come from? Acording to Klimishin, what is a typical for historian explanation, it was a decline of the antique culture that took place:

"*After a marvelous blossoming of the ancient culture on the European continent, there came a long period of stagnation and regress — lasting for more than 1000 years, which we call today the Middle Ages. . . . During these 1000 years, not even one significan astronomical discovery was made.*" Basically, the traditional explanation of this phenomena can be simply summarized as: *Christianity is not compatible with science.*

According to A. Berri, "*history of the Greek astronomy essentially ends with Ptolemy. The art of astronomical observation collapsed to such a degree that during the eight centuries, separating Ptolemy from Al-Baghdadi, there wasn't al-*

most any astronomical observation made of scientific nature. " Historians of science, following Scaliger's chronology, are forced to call this situation a "relapse of childhood," explaining that the ideas of the flat Earth, which are usually concieved during the childhood, found thier way to dominate people's minds. But these arguments are not convincing. We have seen how Greek scientists and philosophers were able to effectively prove that the Earth is spherical, determine its dimensions, and even, alghough it was not very precise, to compute the distance from the Earth to the Sun and Moon. It can hardly be considered as an explanation that new generations obsessed by religious fanatism attempted to distroy the rising up knowledge of science because of their relapsing childhood ideas.

Figure 1.22: *Medieval drawing of Ptolemy*

A. Berri provides the following comments regarding Scaliger's history of the astronomical development:

"*About fourteen centuries elapsed from the proclamation of the Almagest to the death of Copernicus (1543) ... During that time ... not even one astronomical discovery of primary importance was made. ... Theoretical astronomy barley made some progress and in some sense cases suffered retrogression. In fact, the astronomical doctrines that were followed during this epoch are clearly inferior to the Ptolemy's ideas and demonstrate significantly lower level of understanding than the astronomical theories used in the ancient times. As we have seen, in the Western European astronomy nothing substantial took place during the five centuries after the death of Ptolemy. After that there was a rather steady period, and many centuries passed before we could see a more or less significant revival of interests in astronomy.*" Finally, he concludes that "*Regarding the Europe, the gloomy period following the collapse of the Roman Empire (apparently in the 6th. century A.D. — Authors) ... constitutes constitutes not only a disruption of history, but also disruption of every branch of science.*"

In our opinion these "disruptions," "periods od silence," "dark ages" etc. exist only because historians are using the incorrect Scaliger version of chronology.

On Figure 1.22 we show a medieval drawing of Ptolemy who clearly wearing medieval cloths.

1.9 Mathematical and Statistical Methods for Dating Events of Ancient History.

There is clearly a need for new and independent scientific methods to investigate the correctness of Scaliger's chronology. In this section we would like to mention some of those new mathematical and statistical methods that were developed by A.T. Fomenko with the purpose of examining dependences between historical texts. Due to its complexity and large amount of material that was analyzed, it is not possible here to discuss this topic in details. We will only present a brief discussion of these methods and describe the most significant results that were obtained by A.T. Fomenko and G.V. Nosovsky. We refer all the interested readers to the Fomenko's monograph [103] for more details and more information.

Let us point out that the problem of recognizing dependences and dependent texts (for example the texts with the same primary source) arise in many branches of applied statistics, linguistics, physics, genetics, forensics, etc. There are many various methods used for finding dependences of this sort. In particular, they are useful in criminal investigations where they can provide tangible proofs based on the collected physical evidence that an event occurred. Identifying fingerprints, bloodstains, fibers, the marks on a bullet, footprints, various marks on the body and all kinds of even microscopic traces, require more than just an impression that two patterns are similar. To determine with high confidence a match between two patterns is a serious mathematical problem requiring precise calculations of probabilities.

The existence of strange "repetitions" in chronology was already known for a long time, since N.A. Morozov identified several similarities between the so-called dynasty functions. In order to be able to present a solid proof that these similarities are not coincidental and that they in fact indicate a historical "mistake" of misinterpretation of historical documents, it is necessary to analyze them statistically exactly in the same way as it is done regarding the physical evidence in a criminal investigation. The method suggested by A.T. Fomenko is based on empirico-statistical procedures that can extremely useful not only in analyzing narrative texts such as historical chronicles, but in other areas of sciences, for example in studying biological codes.

Let us explain more clearly how the historical material, such as chronicles, can be analyzed using mathematical methods? For example, it is possible to extract all kinds of numerical information from these documents. Suppose we are analyzing a text X — a historical chronicle. We can create a sequence of integers representing the number of words used in the chronicle to describe events in subsequent years. If T denotes the year T, then the value $X(T)$) would be the number of words in the chapter describing the year T, which would be here the *volume of a fragment* corresponding to the year

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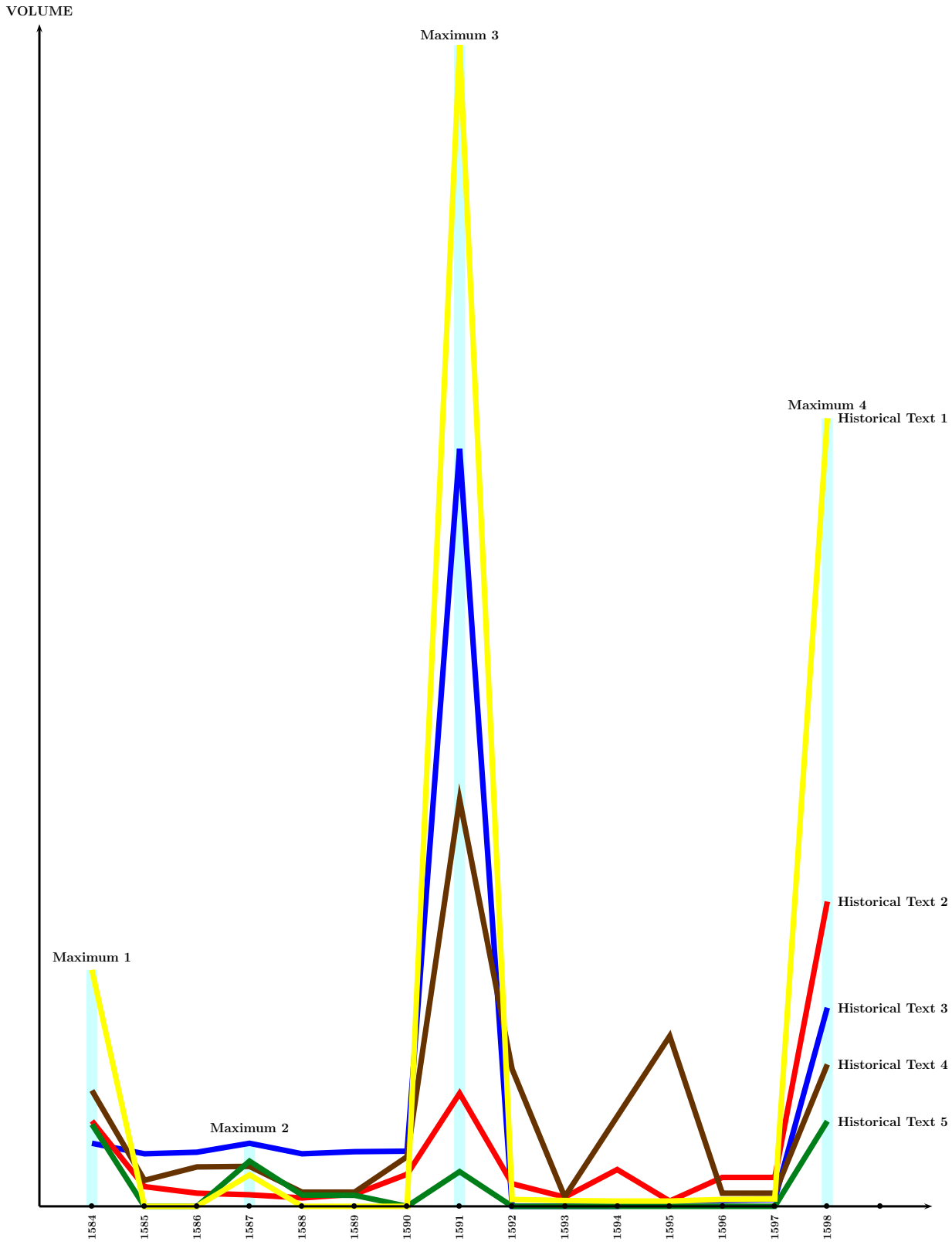

Figure 1.23: *Comparison of the volume functions of dependent historical texts: 1) Vremennik Timofeeva, 2) Piskarevskiy letopisets, 3) Skazaniye o Fyodore, 4) Novyi letopisets, 5) The 1617 Chronograph*

T. Such a function $X(T)$ is called by Fomenko the *volume function* for X. Of course, it is easy to define many other similar numerical functions that could be used as an "identificator" of the text X. For instance, the frequency the year T is mentioned in the subsequent chapters of X, the number of all the names of historical persons listed in the text, or how many times these names were mentioned in the whole text. In his monograph [103], A.T. Fomenko used several such functions to analyze similarities and differences between various historical documents, for which carried appropriate statistical calculations and precise evaluations of probabilities. The main problem was to identify which of the considered documents referred to the same epoch or two different epochs. In the case of two volume functions, this could be done as follows: It is clear that for two different documents X and Y their volume functions $X(T)$ and $Y(T)$ can be completely different even if they refer to the same epoch. However, if X and Y describe the same sequence of events, then it is most probable that they will have the same distribution of local maxima. It is quite obvious, that important events in both documents would be presented in a more elaborated form. That means for those "important years" T the volume functions $X(T)$ and $Y(T)$ would have local maxima. Consequiently, the both functions $X(T)$ and $Y(T)$ would have similar distribution of their maxima or the "important years." A question arises how to determine the probability that two volume functions with similar maxima distribution are refereeing to the same sequence of events. A.T. Fomenko did the probability calculation and verify their accuracy on the chronicles related to the well documented epochs. On Figure 1.23 we show the distribution of local maxima for five different chronicles describing the same sequence of events. It is clear that, indeed, their maxima are located almost in the same positions.

On the other hand, the coincidence of local maxima of two volume functions can be used to identify, with very high probability, that two hisorical texts describe the same epoch and the same sequence of events, even if they were mistakenly associated with different epochs. This method of matching dependent texts is called by A.T. Fomenko *the principle of maximal correlation*. This principle was empirically checked using the reliable historical data of 16th – 19th centuries, and its correctness was confirmed. Therefore, the locations of the maxima constitute the numerical data that can be associated with the text X in order to characterize the epoch it is referring to.

An example of a simple scalar function, which can be easily extracted from the historical database, is the functions of the time-span of the reign of subsequent rulers belonging to a certain specific dynasty. Such a *dynasty function* can be illustrated by its graph, which is shown on Figure 1.24. On the horizontal axis are placed the subsequent numbers of the consecutive rulers (or names of kings, emperors, etc.) and on the vertical axis is marked the length of the reign of the corresponding ruler. Fomenko calls such a sequence of rulers a *numerical dynasty* or simply a *dynasty*. The dynasty in the above example consists of 12 rulers. Again, it is clear that two

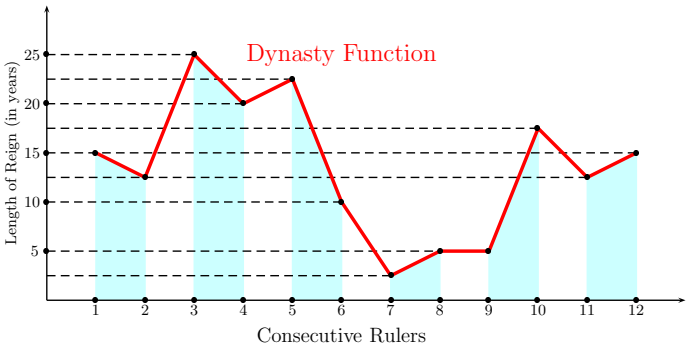

Figure 1.24: *Example of a dynasty function*

chronicles (even if they have some discrepancies and are written in different languages with different calendar conventions) describing the same portion of history, would produce similar dynasty functions. It is possible to determine the confidence interval corresponding to a very high probability, that allows us to identify such *dependent* dynasty functions, in which case we can determine that the similarities are not coincidental and in fact, they indicate that they represent the same sequence of historical events.

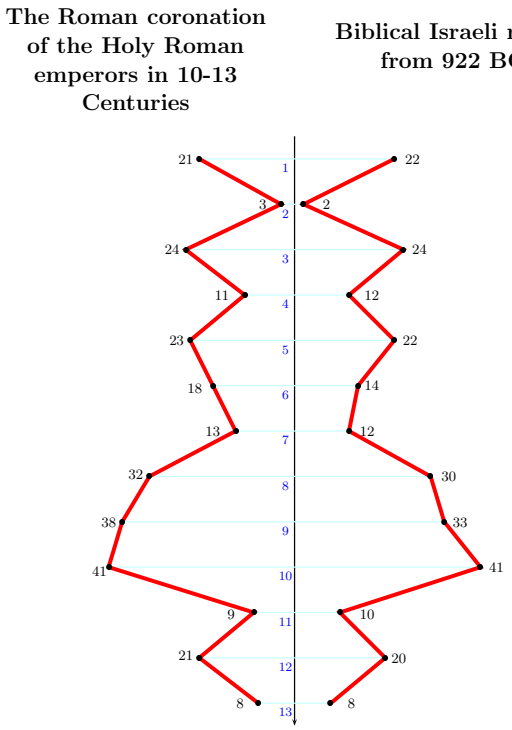

Figure 1.26: *Parallel between the Roman coronation of the Holy Roman emperors and the biblical Israeli rulers*

It may sounds strange that mathematical methods can be effectively used to investigate correctness of historical dating, but it is exactly what is the case here. The methods of Fomenko, which are based on theoretical and empirical analy-

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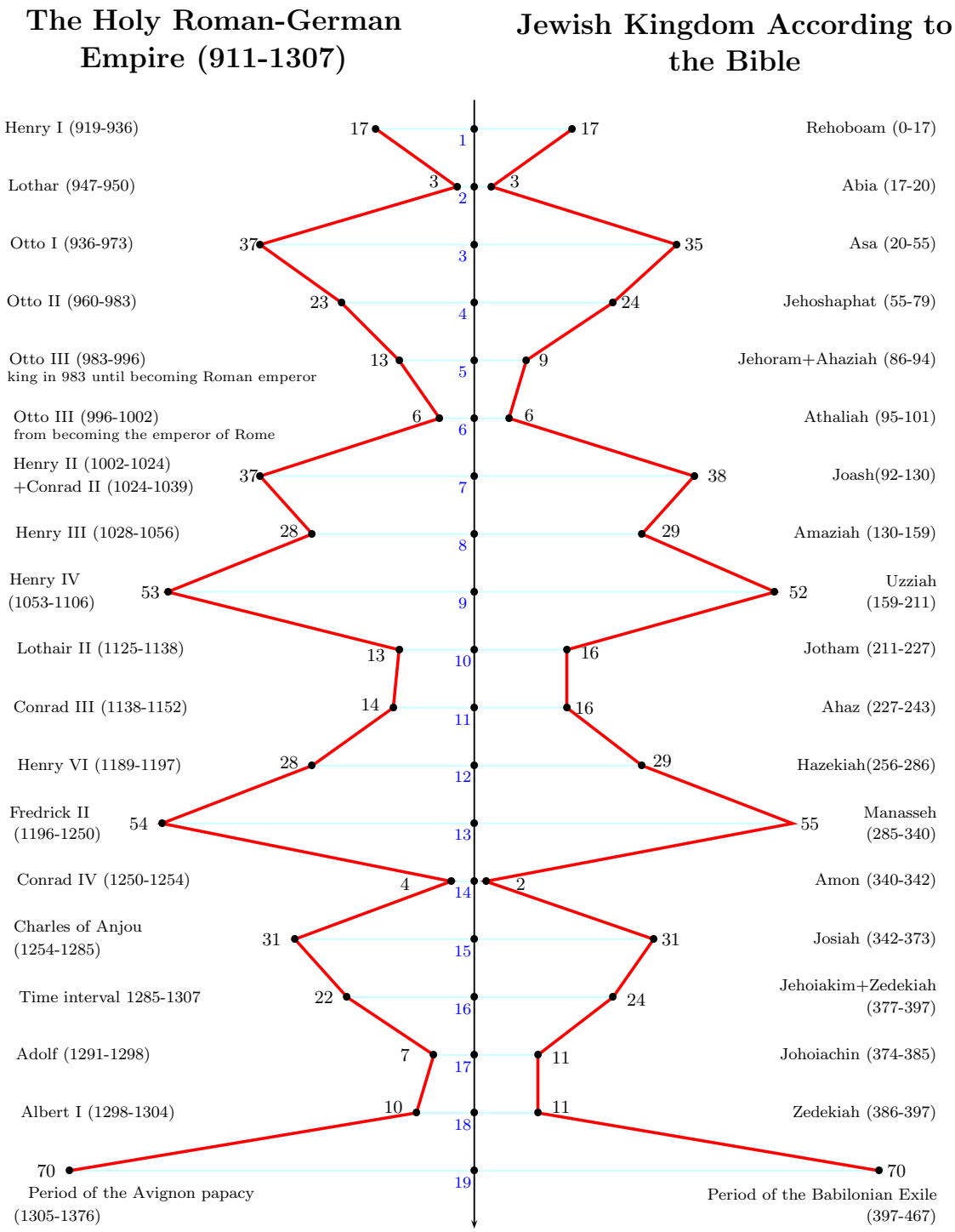

Figure 1.25: *Parallel between the Holy Roman-German Empire and Jewish Kingdom*

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sis of numerical functions associated with historical data provided a very effective tool to identify multiple duplicates in history.

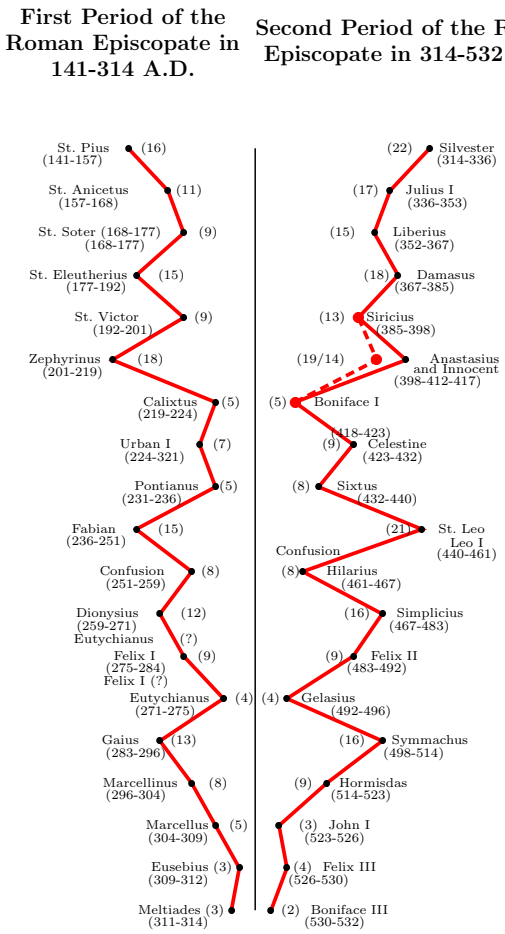

Figure 1.27: *Parallel between first and second periods of the Roman Episcopate*

In order to give to "similarity" a more precise meaning, Fomenko's introduced a routine for distinguishing functions referring to different dynasties and defined a certain *measure of distinctiveness* between them (or rather a *probability measure for distinctiveness*). In simple words, he found a way to measure a 'distance' between the above numerical functions (like for example dynasty functions) as we measure a distance between two different locations. Mathematicians say that in such a case that they are dealing with a *metric space*. The geometry of a metric spaces is definitely different from the geometry we learn in school, but the usual properties related to the measurement of distances are still valid there. Now we can apply the idea, that if a distance, let's say, between two towns A and B is less than few hundreds meters, then we are justified to think that in fact A and B represent practically the same town. Similarly, if a distance between two dynasty functions is sufficiently small we may think that indeed they represent the same dynasty. These methods were extensively tested on the data referring to well documented epochs. It was proved that if two dynasty functions (for 15 rulers) or volume functions were not related, the measure of distinctiveness between numerical functions associated with these dynasties was between 1 and 10^{-4}. However, in the case of related events from the same epoch, the measure of distinctiveness was never larger than 10^{-8}.

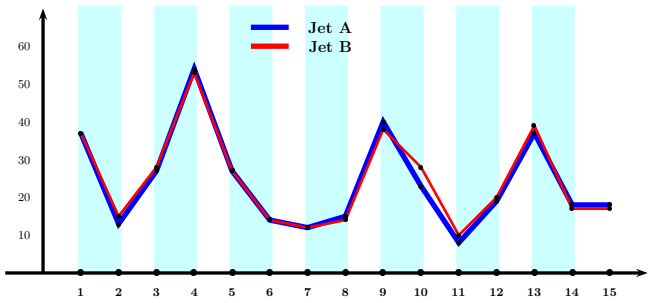

Figure 1.28: *Parallel between the Holy Roman Empire in the 10-13th cc. A.D. and the Second Roman Empire in the 1st c. B.C.-3rd c. A.D. Two graphs combined. Rigid 1053-year shift.*

It is difficult to imagine that two different dynasties could have identical or almost identical dynasty functions. The probability of such a coincidence is extremely small already for dynasties composed of 10 rulers. Nevertheless, the number of such coincidences, for even longer dynasties of 15 rulers, turns out to be unexpectedly large. N.A. Morozov, who noticed the coincidence between the ancient Rome and the ancient Jewish state, discovered the first examples of surprisingly identical pairs of dynasty graphs. A formal method to study such similarities was introduced by A.T. Fomenko.

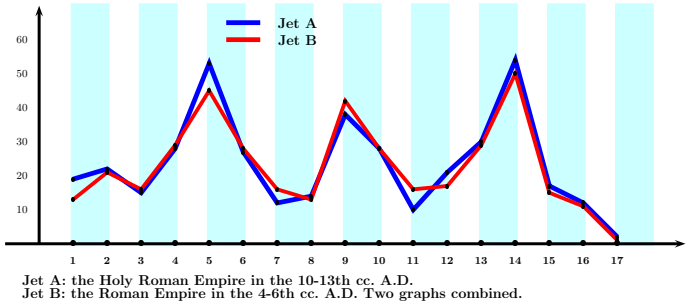

Figure 1.29: *Parallel between the Holy Roman Empire in the 10-13th cc. A.D. and the Roman Empire in the 4-6th cc. A.D. Two graphs combined.*

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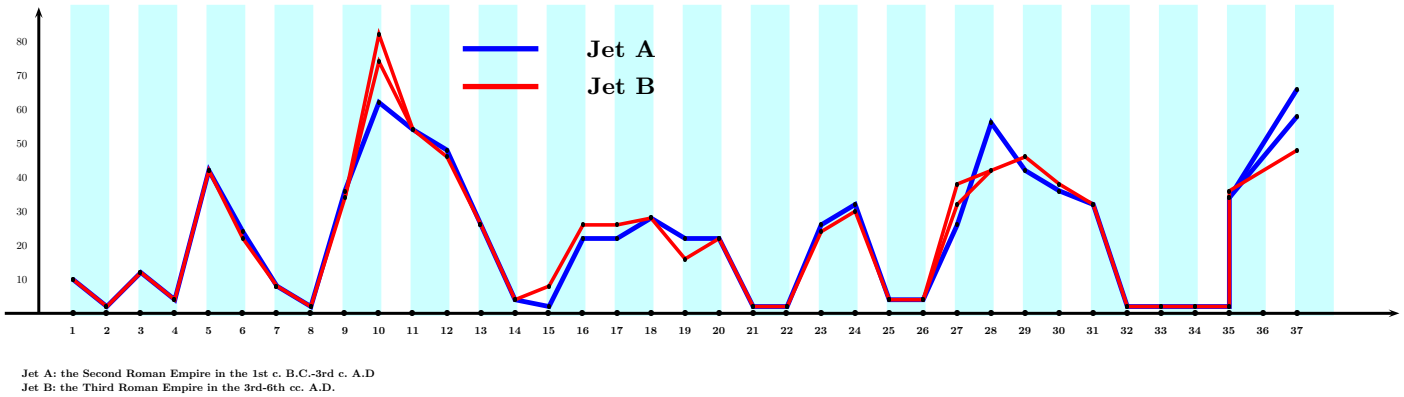

Figure 1.30: *Parallel between the Second Roman Empire in the 1st c. B.C.-3rd c. A.D, and the Third Roman Empire in the 3rd-6th cc. A.D. Two graphs combined. Approximately 333-year shift.*

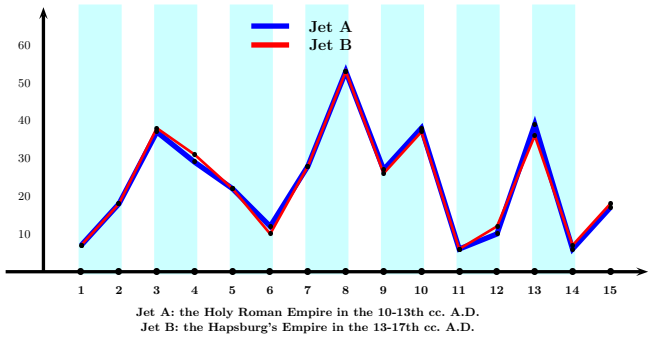

Figure 1.31: *Parallel between the Holy Roman Empire in the 10-13th cc. A.D. and the Hapsburg's Empire in the 13-17th cc. A.D. Two graphs combined. Rigid 362 year shift.*

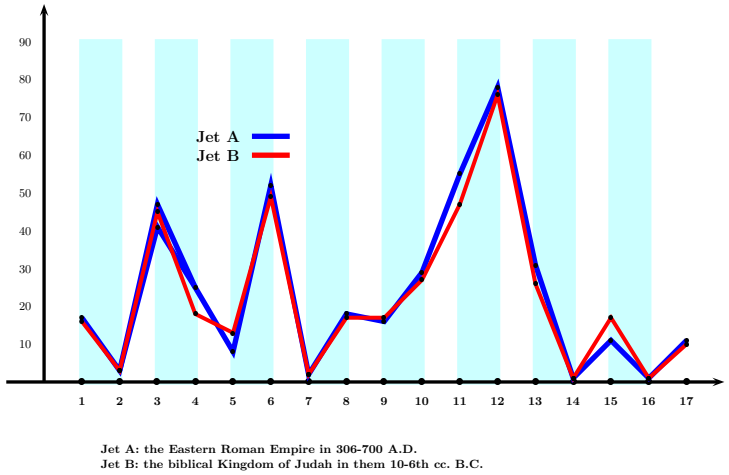

Figure 1.33: *Parallel between the Eastern Roman Empire in 306-700 A.D. and the biblical Kingdom of Judah in the 10-6th cc. B.C. Two graphs combined.*

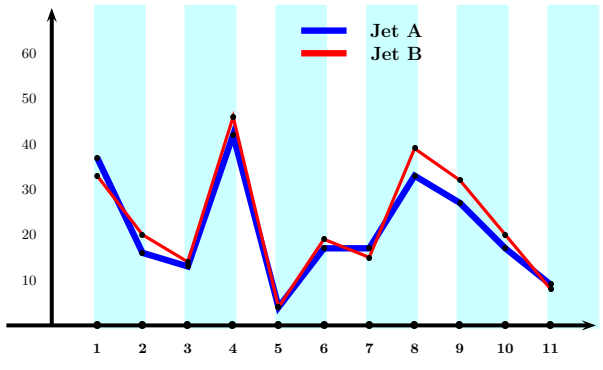

Figure 1.32: *Parallel between the Carolingians in the 7-9th cc. A.D. (Charles' Empire) and the Third Roman Empire in the 3-6th cc. A.D. (basically in the East). Two graphs combined. Rigid 360 year shift.*

There is another surprise, besides coincidence of the dynasty functions, the other numerical functions confirm with very high probability that these dynasties are indeed the same. It brings us to a suspicion that in fact we are dealing with repetitions in the conventional version of the history. Fomenko discovered dozens of strong coincidences, sometimes between three and more dynasties. But, there are no more such coincidences in the history of the better-documented epochs, for example starting from the 16th century.

Using empirico-statistical analysis A.T. Fomenko and his collaborators discovered dozens of *historical repetitions* which most probably were mistakenly organized as unrelated sequences of historical events. Extremely high probability for these identifications exclude any possibility for an accidental coincidence. Let us illustrate several such *historical duplicates* based on selected from the book [103]. We begin with an example showing similarities between two dynasties, one the dynasty of the Holy Roman-German Empire (10th – 13th

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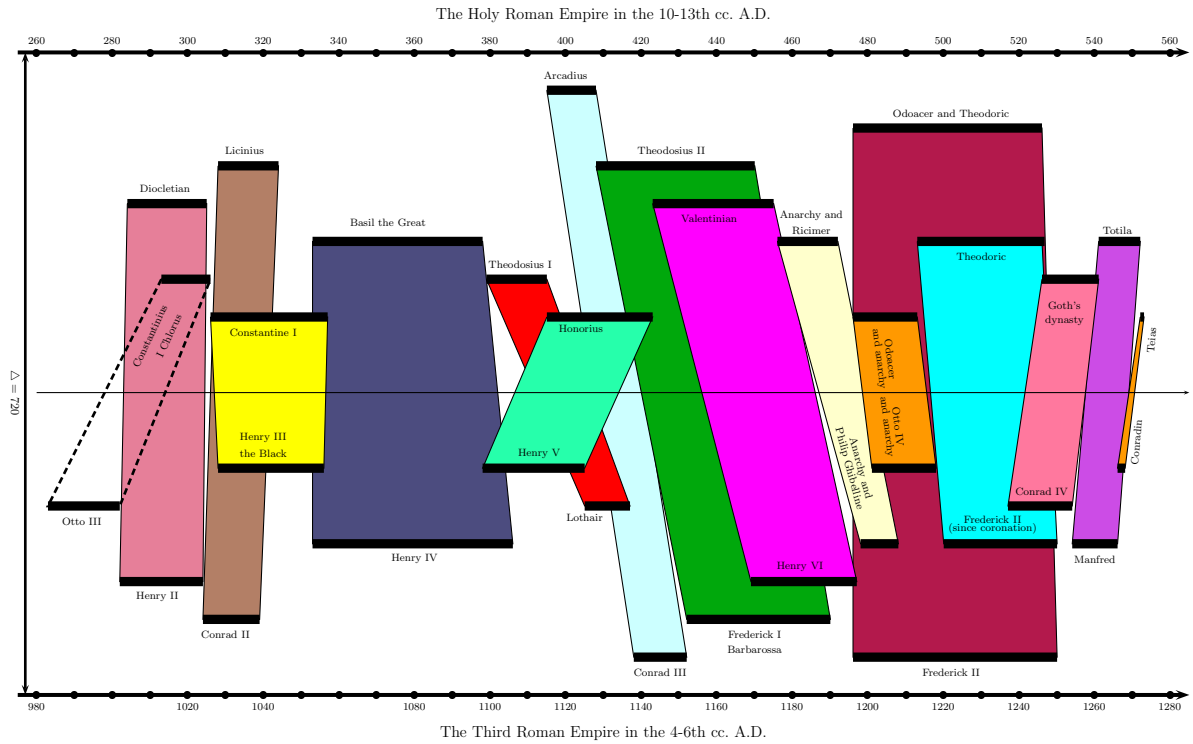

Figure 1.34: *Parallel between the Holy Roman Empire in the 10-13th cc. A.D. and the Third Roman Empire in the 4-6th cc. A.D. The 720-year rigid shift.*

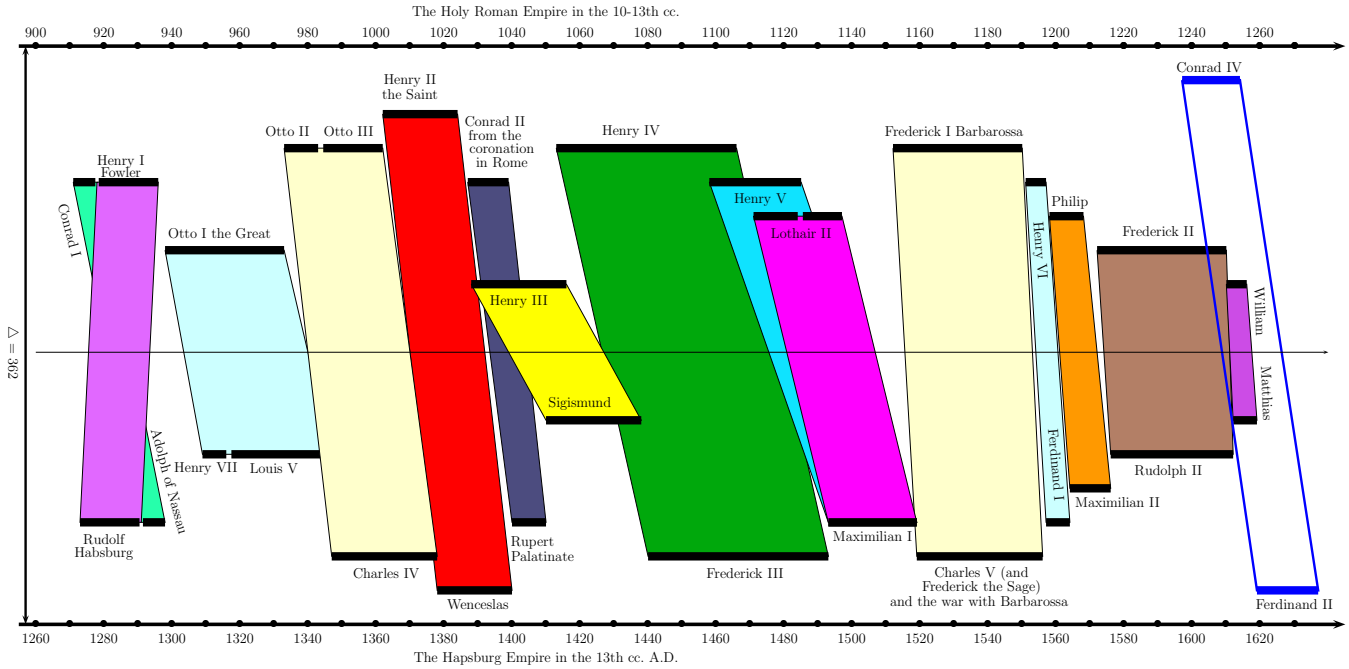

Figure 1.35: *Parallel between the Holy Roman Empire in the 10-13th cc. A.D. and the Hapsburg Empire in the 13th cc. A.D. The 362-year rigid shift.*

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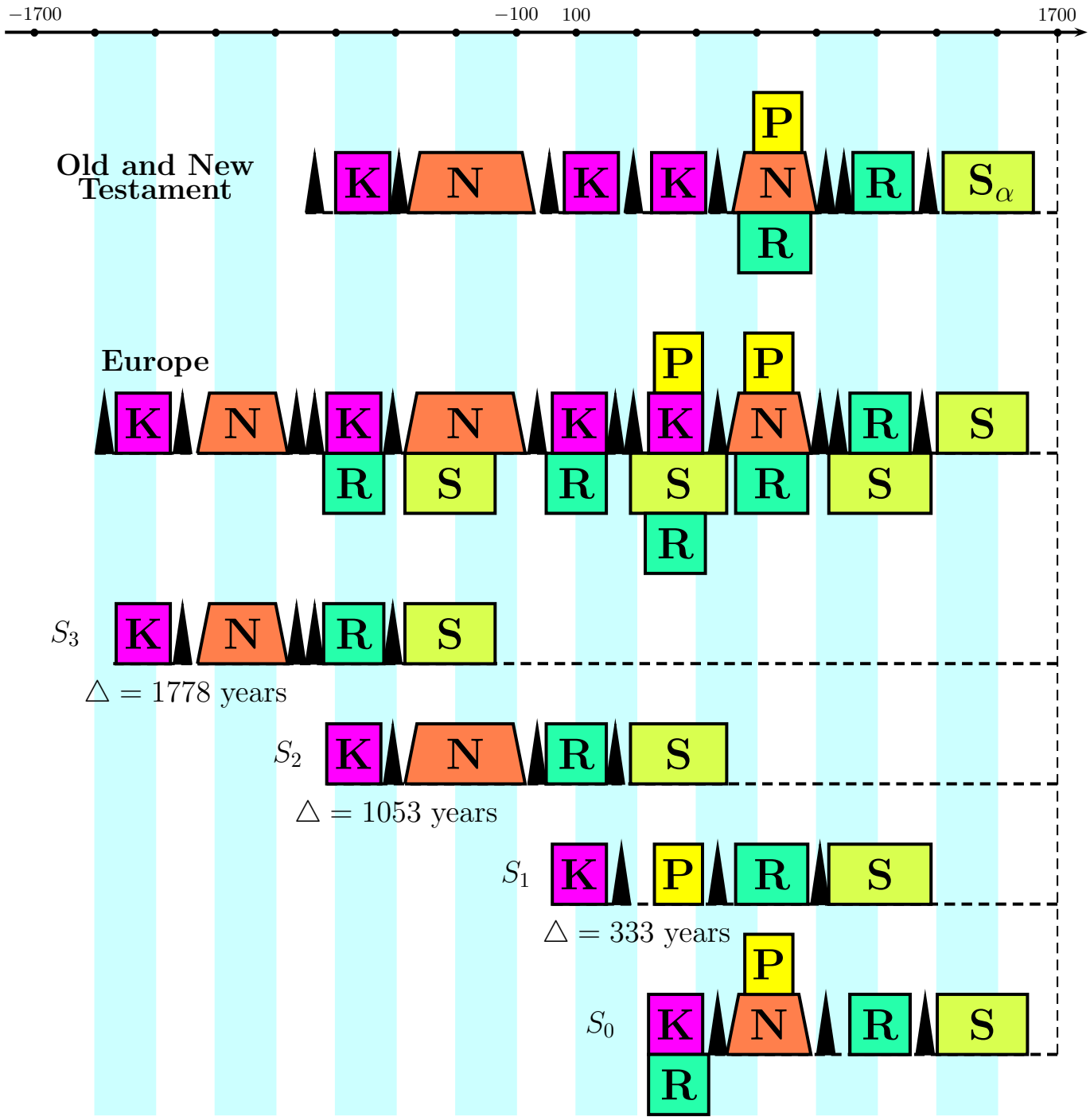

Figure 1.36: *The Global Chronological Diagram and the three main chronological shifts S_3, S_2, S_1.*

AD) and another one of the Jewish kings according the Bible (9th – 5th BC). On Figure 1.25 we show the vertical time line with two graphs of reign durations on its opposite sides for comparison. On this chart, we start the dates for the dynasty of Jewish kings in the year zero, which is not a date according to some era but simply indicates the starting "zero" point for this dynasty. According to Scaliger's chronology the beginning of this dynasty is around 922 B.C. Figure 1.25 was taken from the monograph [103] by A.T. Fomenko.

There are many more examples of similar dynasty pairs in the conventional chronology. For instance, the parallel between the first period of the Roman episcopate in 141-314 A.D. and the second period of the Roman episcopate in 314-532 A.D. is shown in Figure 1.27. On Figure 1.26, we present another pair of graphs, this time without annotations. All the graphs were also taken from the monograph [103]. The parallel between the Roman coronations of the Holy Roman emperors and the biblical Israeli rulers shown in Figure 1.26.

Another historical duplicate, or *parallel* is illustrated on Figure 1.27, where we show a repetition in the chronology line of the Roman Episcopate. In the example on Figure 1.29, we show strong similarities between the Holy Roman Empire of the 10th–13th centuries A.D. and the Roman Empire in the 4th–6th centuries A.D. Then, on Figure 1.30 we show the repetition of the dynasty functions for the Second Roman Empire in the 1st century B.C. – 3rd century A.D. and the Third Roman Empire in the 3rd–6th centuries A.D.

In Figure 1.31 we show a parallel between the Roman Empire in the 10th–13th century A.D. and the Hapsburg's Empire in the 13th–17th century A.D. Next, on Figure 1.32 there is another parallel between the Caroligians in the 7th–9th centuries A.D. and the Third Roman Empire in the 3rd–6th century A.D. Finally, on Figure 1.33 we illustrate the repetitions between the Eastern Roman Empire in 3006–700 A.D. and the Biblical Kingdom of Judah in the 10th–6th centuries B.C.

Another type of graphs was used in Figure 1.34 to show the parallel between the Holy Roman Empire in the 10th–13th centuries A.D. and the Third Roman Empire in the 4th–6th centuries A.D., and in Figure 1.35 between the Holy Roman Empire in the 10th–13th centuries A.D. and the Hapsburg's Empire in the 13th-15th century A.D.

These parallels suggest that the traditional history of ancient times consist of multiple recounts of the same events scattered in many locations at various times. The first scientist who realized it was N.A. Morozov (see [4]). A.T. Fomenko found several new parallels, some of them between more than two dynasties, and was able to decipher the principle structure of these duplicates in European and Biblical history (see [103]). He discover that the existence of duplicates of dynasty functions resulted from three main historical shifts, which can be seen as historical repetitions. On Figure 1.36, we show a graphical representation of the duplicates and the main historical shifts (discovered by A.T. Fomenko) that are related to the Roman and European history. On the graph the chronological blocks annotated by the same letters (what we also emphasized by adding colors) represent duplicates in the conventional chronology. The main shifts are denoted by the symbols S_3, S_2 and S_1..

The work of Fomenko and his collaborators proves that the statistical analysis can be successfully applied to analyze the numerical data contained in historical documents. A.T. Fomenko and G.V. Nosovsky also developed several other statistical criteria for distinguishing or recognizing identical sequences of historical events. We should mention for example the method of detecting chronological shifts based on the names distribution in chronicles and the method of relation matrices used to recognize duplicates and decompose chronicles into its source fragments (see [103]).

Chapter 2

Ancient Egyptian Zodiacs

2.1 Egyptian Zodiacs

Egyptian zodiacs are nothing other than symbolic maps representing, in a specific "ancient" Egyptian style, astronomical objects on the sky. If we look upward at the sky on a clear night we will have an impression that the sky is a great hollow spherical shell with the Earth at the center, which is sometimes called *celestial sphere*. This celestial sphere is gradually and continuously changing its orientation, which is caused by the rotation of the Earth. However, a careful observer can notice that some stars do not rise or set. There seems to be a point in the sky about which the whole celestial sphere appears to turn. A star at this point would appear motionless in the sky. The North Star is within 1^o of this pivot point. An observer at the North Pole of the Earth would see the stars appear to circle about the sky parallel to the horizon. It was already known to ancient Babylonians, Egyptians and Greeks that the Sun changes its position on the celestial sphere. Of course it is impossible to see the position of the Sun with respect to the stars in the daylight but nevertheless it is possible to observe the exact position of the Sun among the stars twice per day. The first time, just before the sunrise when the stars are still visible, we can determine the position on the celestial sphere of the point on the horizon where the Sun will appear (expecting that the Sun will rise in the same point as yesterday). Similarly, we can observe the position of the Sun just after the sunset. In the course of one year, the Sun completes a circuit of the celestial sphere. This apparent path of the Sun is called *ecliptic* (because eclipses can occur only when the Moon is on or near it). Of course, the sun's motion on the ecliptic is an illusion produced by the Earth's annual revolution about the Sun. It was noted by the ancients that the ecliptic does not lie in a plane perpendicular to the line between the celestial poles, but is inclined at an angle of about $23\frac{1}{2}^o$ to that plane. This angle is called the obliquity of the ecliptic. The individual paths of the Moon and planets in the sky all lie close to the ecliptic, although not exactly on it. The planets and Moon are always found in the sky within a narrow belt 18^o wide centered on the ecliptic, called the *zodiac*. This zodiac belt is a celestial highway where the motion of all the planets as well as of Sun and the Moon take place when observed from the Earth. Twelve zodiac constellations are placed along the ecliptic filling the zodiac belt. Their names are *Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricorn, Aquarius, and Pisces*. Each of the twelve zodiac constellations is located in a sector 30^o long on average. In modern astrology, instead of zodiac constellations, there is usually used an equal partition of the zodiac belt into regions of exactly 30^o long, called zodiac houses and named after constellations, with the starting point being the spring equinox of the date, i.e. the position of the Sun on the ecliptic when day and night become equal in the spring, which nowadays happens approximately around March 21. Since the spring equinox is moving along the ecliptic with the speed around 1^o in 70 years, the zodiac houses do not coincide exactly with the corresponding zodiac constellations and, in fact, after about 2100 years their positions shift.

The key concept in astrology is a horoscope, which is a chart that shows the positions of the planets in the sky with respect to zodiac constellations. The ancient Egyptians knew about the planets moving within the zodiac belt and attributed great importance to their positions with respect to the zodiac constellations and, unknowingly, were able to encode in the horoscopes specific dates which with today's technology can be easily deciphered, however not necessarily with a unique result. Contemporary astrology constructs horoscopes based on the position of the planets with respect to the zodiac houses which are calculated, but in ancient times the horoscopes were made according to the actual view of the constellations in the sky. The visual positions of the planets are determined by the light rays from Earth passing through the planets. As was mentioned above, all these rays lie approximately in the same plane, which is the common plane for all planets' orbits in the solar system. In fact there are some slight differences in planes of orbital movements but they are very close to each other. This means that all the rays from the Earth to the planets and the Sun and Moon meet the celestial sphere somewhere inside the zodiac belt. An Egyptian *horoscope* is nothing else than the position of the planets (including Sun and the Moon) with respect to the zodiac constellations. In ancient times the Sun and Moon were also included in the list of planets because they change their visual positions on the celestial sphere, contrary to the stars. Therefore, the ancient horoscopes contained the total number of seven planets: *the Sun, Moon, Jupiter, Saturn, Mars, Venus and Mercury.*

At any time there are 12 possible zodiac constellations where each of the seven planets may appear. Positions of the Moon, the Sun, Mars, Jupiter and Saturn are independent of each other. However, due to the inner orbits with respect to the Earth's orbit, the visual angle distance from Mercury and the Sun cannot be larger than 28^o and the angle distance from Venus to the Sun must be smaller than 48^o. This means that for each fixed position of the Sun in the zodiac there are only 3 possible positions for Mercury and 5 possible positions for Venus. It is not difficult to compute that there are exactly

$$12 \times 12 \times 12 \times 12 \times 12 \times 3 \times 5 = 3,732,480$$

different horoscopes. Since an average horoscope remains on the sky for about 24 hours, there are about 365 different horoscopes every year. Therefore, a specific horoscope reappears only after 10 thousand years in average. However, in reality some horoscopes may reappear two or three times after 8 or 9 hundred years and later disappear for more than several dozens thousands of years. One can easily perceive that from the point of view of its universality and accuracy, a horoscope is a perfect tool to record dates, with a precision of one or two days on average, which is independent of any particular dating system. Therefore, if a symbolic representation of the zodiac constellations contains symbols or names of the planets, we have reason to believe that it is not only an artistic object (painting or sculpture) but it should be considered to be a horoscope that can be dated.

The Egyptian zodiacs contained specific ancient symbols to illustrate astronomical objects, which today can be analyzed in order to answer the most intriguing question: **When exactly did the ancient Egyptian live and when were the famous ancient Egyptian temples constructed?** In other words, the dating of the horoscopes shown on ancient Egyptian zodiacs provides a suitable, according to the present scientific standards, method for establishing milestone dates for the chronology of the Ancient Egypt. We can reveal that the analysis of all the ancient Egyptian zodiacs leads only to medieval dates with the majority of them located after the twelve century and even later. These results match very well with the *New Chronology* (see [103],[105],[106],[117]), according to which the most ancient events of the documented history took place not earlier than in the eleventh century A.D. (see 1.9).

We would like to observe that commemoration of certain dates by horoscopes was very widespread in the ancient Egypt. Even today, imitations of ancient horoscopes are popular in Egypt where tourists can find them without trouble, among other "ancient" Egyptian artifacts, in almost every souvenir store. One of these papyrus drawings, that was purchased in year 2000 in Luksor is illustrated on Figure 2.1.

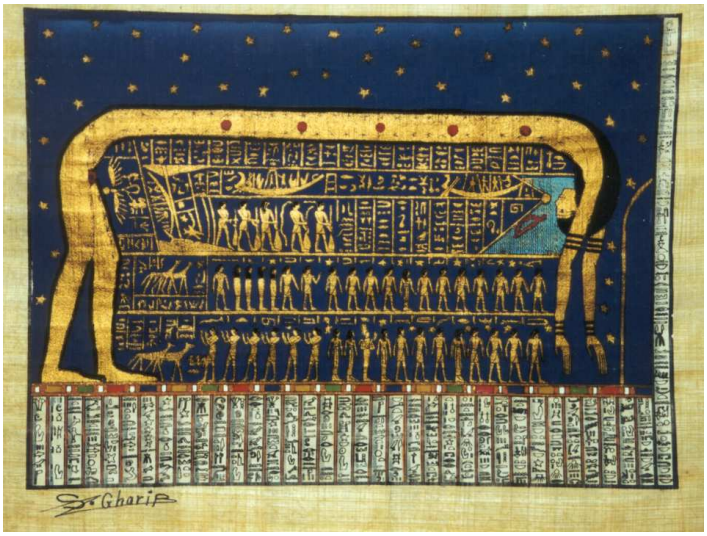

Figure 2.1: *Modern Egyptian papyrus with a picture of an old zodiac.*

In many such stores, a tourist can even order his or her "ancient" Egyptian zodiac with a horoscope to be drawn on a papyrus. Nowadays there is no need to observe the locations of the planets but it is sufficient to have a computer and an astronomical software that can be easily downloaded from the Internet, and the whole task of making an "ancient" Egyptian zodiac is reduced to arranging appropriately into it the "ancient" Egyptian symbols. Therefore, any of would-be ancient Egyptian zodiacs should be studied with great caution because it could be a forgery or simply a zodiac that was made in eighteenth or nineteenth century when this ancient tradition was still alive in Egypt. It will be explained later, with more details, that the zodiacs in Egypt were connected to burial rituals. These burial traditions could be cultivated by Egyptians much longer than usually assumed. Moreover, many fake horoscopes could also be fabricated in nineteenth century when the ancient Egypt became fashionable among reach Europeans. Therefore, when working on dating of an ancient horoscope, we should be prepared for a possibility that the obtained date could be much later than expected. For example, it is quite possible that the date of an "ancient" Egyptian zodiac could indicate the nineteenth century even if it was discovered in a very "ancient Egyptian tomb." There is a problem that the present dating methods of archaeological findings from ancient Egypt are very imprecise, erroneous, and often leading to the wrong conclusions. For example, using these methods a tomb dated as a very ancient burial place could turn out, as it sometimes really happens, to be constructed in the nineteenth century.

Very often, the fact that an Egyptian picture represents a zodiac may not be evident at the first glance. However, there are some definite features which can be used to recognize easily such pictures as zodiacs. For example, on almost every Egyptian zodiac there is a dominating female figure with raised hands, and her body usually shaped in form of an arc symbolizing the sky. This figure is commonly recognized as the "Egyptian goddess Nut" (see Figure 2.2). One can easily identify this symbol on Figure 2.1.

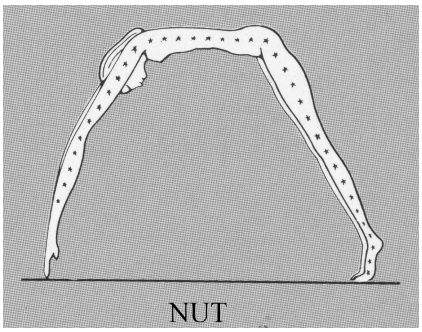

Figure 2.2: *"Ancient Egyptian goddess Nut."* (Taken from [7], p.10)

Let us present several examples of Egyptian zodiacs. All these zodiacs will be discussed in details later in this book, but for now we would like only to give an idea about possible different appearances of Egyptian zodiacs. On Figure 2.3 we show an ancient Egyptian zodiac that was found in the Kings Valley near Thebes. This picture was made during the Egyptian expedition of Napoleon and published in the Napoleonic edition of the album *La Description de l'Egypte*.

On Figure 1.4 we show a part of the low relief depicting a zodiac which was found on the ceiling in an ancient Egyptian temple in Denderah. It is big relief of dimensions 2.55×2.53 meters, that is considered to be the most famous Egyptian zodiac. It is called *"Round Denderah Zodiac"* (because of it's round form) in order to distinguish it from the *"Long"* or *"Rectangular Denderah Zodiac"* which was discovered in the same temple in Denderah. The Round Denderah zodiac was

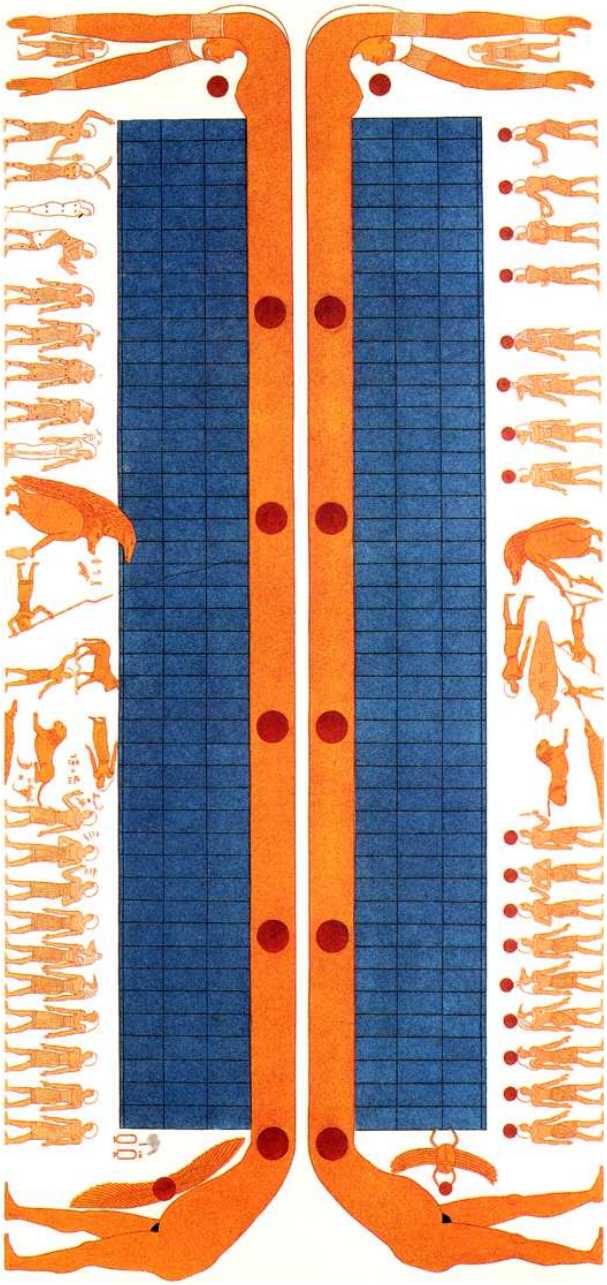

Figure 2.3: *Zodiac found in the Kings Valley near Thebes.* (Taken from [2] – "Tableau Astronomique peint au plafond du premier tombeau des Rois à l'Ouest", plate 82)

found by Europeans in 1799 during the Napoleonic invasion of Egypt and later removed and taken to Paris. Today the original Round Denderah zodiac is displayed in Louvre museum in Paris while a copy decorates the ceiling of the Denderah temple.

The central part of the Round zodiac is shown on Figure 2.5, where it is possible to see better some of the figures representing zodiac constellations and planets. We will discuss in detail all these symbols later in Chapter 5.

Figure 2.4: *Round Denderah Zodiac.* (Taken from [120], p.115)

Figure 2.5: *Central part of the Round Denderah Zodiac.* Taken from [13], p.255)

A drawing of the complete Round zodiac is presented on Figure 2.7 and the drawing of the Round zodiac taken from the Napoleonic Album *"La Description de l'Egypte"* is shown on Figure 2.6.

This picture looks very nice and it is clear that the artist tried to be accurate in the smallest detail. However, in the same time, it is easy to notice that its style was modified following eighteenth century fashion — the original is much more primitive. It is not hard to recognize on the Round zodiac symbols of all twelve zodiac constellations which are placed inside the central circle of the zodiac. It is strange that these symbols appear exactly in the same way as in the European medieval astronomical books. Leo is represented by a figure of lion, Sagittarius is a centaur shooting an arrow, Capricorn is a fantastic creature with a fish tail and goat head, etc.

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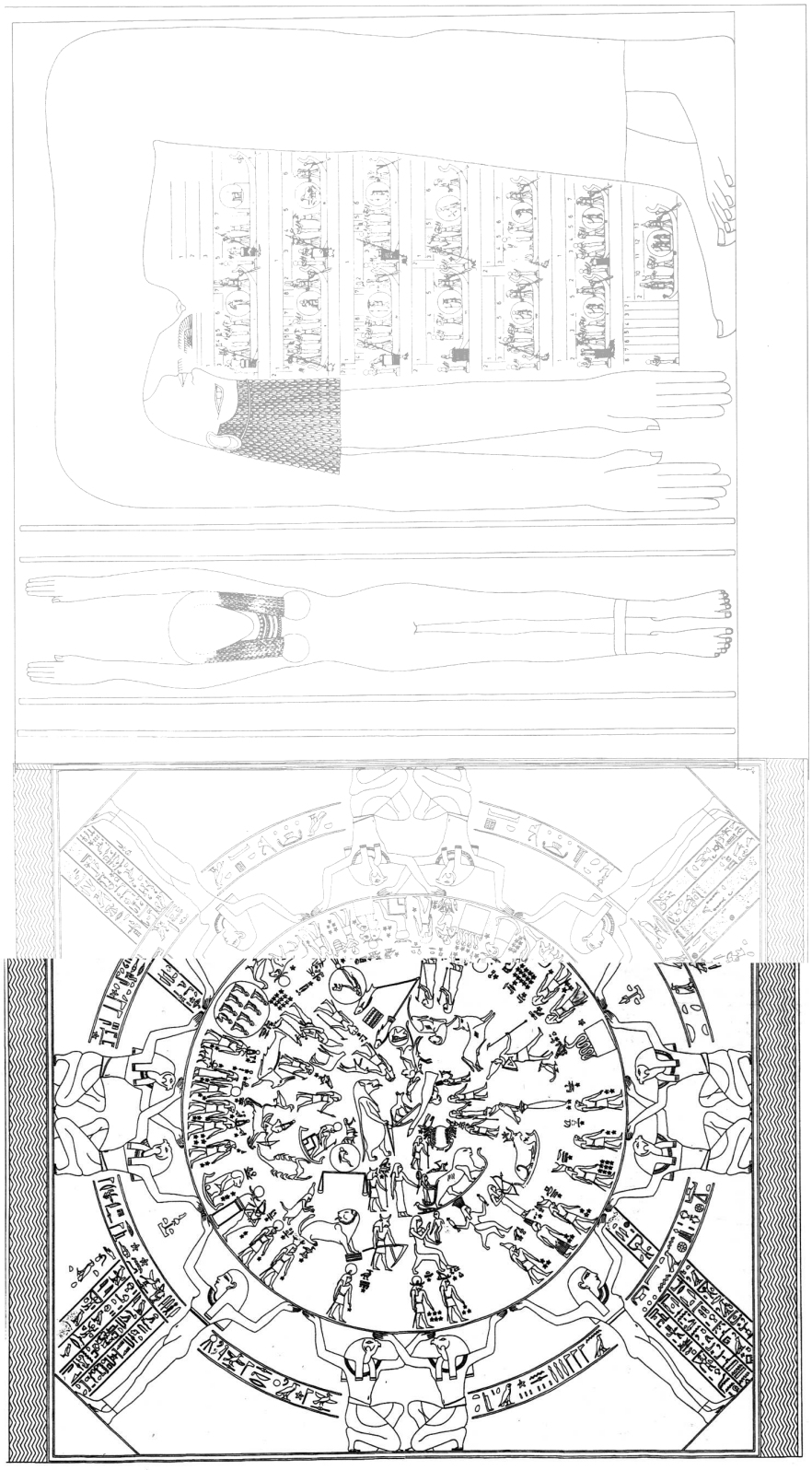

Figure 2.6: *Drawing of the whole Round Denderah Zodiac with two Nut Goddesses on its side.* (Taken from [10], p.71)

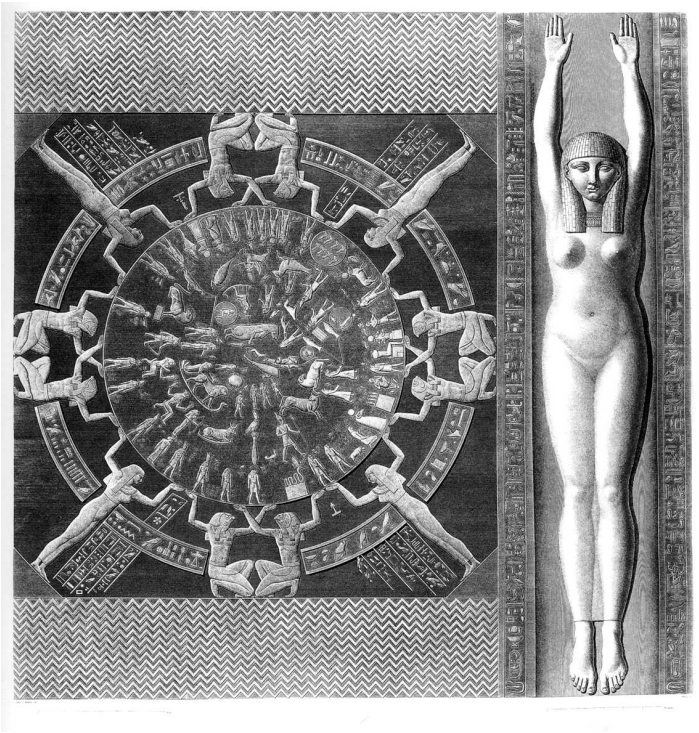

Figure 2.7: *Round Denderah Zodiac from the Napoleonic Album.* (Taken from [2], A. Vol. IV, Plate 21)

Nikolai A. Morozov, who throughly studied the Round zodiac at the beginning of the twentieth century, wrote: *"Look at ... the symbols of zodiac constellations ... They are drawn in a fine and clear manner outlining the zodiac belt, in exactly the same way it is placed in the real sky. It is not concentric with ... the celestial equator but it is raised noticeable around the area of the summer constellations of Cancer and Gemini and lowered on the opposite side near the winter constellations of Sagittarius and Capricorn. These symbols are not much different from those we can find on Bayer's astronomical charts or even in nineteenth century astronomical books."*[1] So, it is evident that the author of the Round zodiac was quite competent in astronomy.

We will explain later that practically every symbol in the Round zodiac has definite astronomical meaning. As we mentioned earlier, in the same temple in Denderah, beside the Round zodiac, there was also found another zodiac, called the Long or Rectangular Denderah zodiac. It was a low relief on a ceiling of much larger size than the Round zodiac. The Long zodiac consists of two rectangular parts, each of them about 25 m long. The Long zodiac is illustrated on Figure 2.8

These two parts of the Long zodiac are placed on the opposite sides of a large rectangular ceiling of the main hall in the Denderah Temple. All the space between these parts is covered by pictures with astronomical meaning. The size of this impressive ceiling is 25 m $\times$42.5 m. The view of the

[1] See [4], Vol. 6, p. 658.

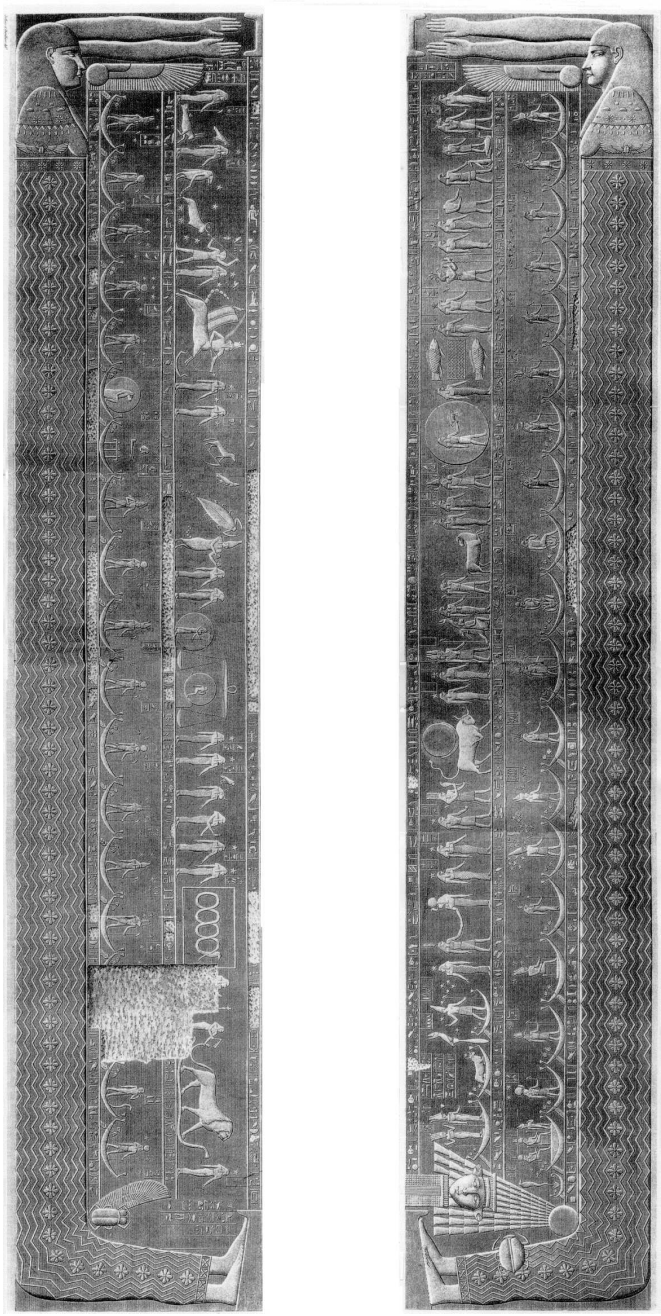

Figure 2.8: *Long Denderah Zodiac from the Napoleonic Album.* (Taken from [2], A. Vol. IV, Plate 20.)

whole ceiling is presented on Figure 2.10. The Long zodiac depicts all twelve zodiac constellations in their correct order as they appear on the sky. Among the symbols of the constellations there are also shown other symbols. We will prove in the subsequent chapters that all these symbols have a precise astronomical meaning associated with the definite and unique date. Some details of the Long zodiac are illustrated on Figure 2.9.

The two Denderah zodiacs were objects of interest for many scientists who were trying to to interpret and date

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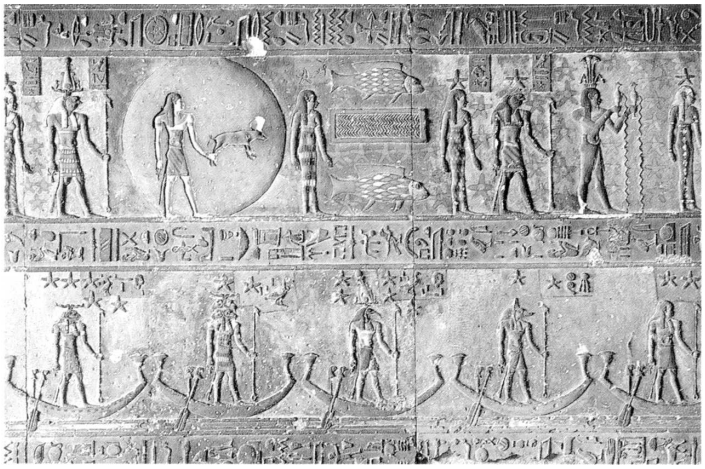

Figure 2.9: *Photograph of a fragment of the Long Denderah zodiac.* (Taken from [10], page 37)

them. Several famous mathematicians and astronomers of the 19th century, such as Ch. Dupuis, P. Laplace, J. Fourier, A. Letronne, K. Helm, J. Biot, etc., attempted to decode the horoscopes shown in these zodiacs and tried to date them astronomically. They made calculations for the possible dates from very ancient times to the year 300 A.D. but could not find any satisfactory solution. In spite of the fact that the horoscopes had all the attributes of a genuine astronomical picture, they stopped the calculations and reluctantly made a conclusion that these two horoscopes are not depicting a real astronomical data from any time and are the product of pure fantasy. This was a gross mistake, because in fact, if they had continued their efforts they would have obtained some satisfactory solutions for both zodiacs. In fact several reasonable solutions were found in the 20th century by N.A. Morozov[2], N.S. Kellin and D.V. Denisenko[3], and T.N. Fomenko[4]. Strangely, all these solutions refer to the medieval dates which were not earlier than sixth century A.D. We will argue that there is more astronomical information contained in the Denderah zodiacs which was not recognized by the previous investigators. With the use of the full astronomical information the solution turns out to be unique (see Chapter 7).

One can ask the question, 'what was the reason for these astronomers to halt all further computations after reaching the year 300 A.D.?" This is an interesting story. The first Egyptologist who analyzed the archaeological site of the temple, dated its approximate construction to be 15 000 B.C. However, later, during the eighteenth century this date was changed to 3 000 B.C. and finally to the first century A.D. In such circumstances the astronomers did not see the reason to look for the date after third century A.D. As we have already mentioned, at that time, when everything had to be done by hand, these calculations were extremely long and tedious. We must say that the dating of the Denderah temple was a questionable process from its beginning to the end. An inscription inside the temple indicated that this temple was built by the famous pharaoh Khufu himself from the 6th dynasty (according to Egyptologists, he reigned around the year 3000 B.C.), who was the same pharaoh who constructed the great pyramid. However, from the style of the sculptures and some inscriptions in the temple it was clear that this temple could not have been built before the time of Sulla or Julius Caesar. If we believe Scaliger's chronology of ancient Egypt, these two sets of evidence contradict each other — the difference between them of about 3,000 years. Without revising the chronology, Egyptologists assumed that all the Egyptian temples which were built and decorated by Romans in the beginning of the Christian era, were constructed on the sites of more ancient Egyptian temples. They suggested that Romans copied with great care, but without understanding, some of the old inscriptions they had found on the walls of the remains of the ancient temples. This was the only way that allowed them to explain these contradictions without modifying the whole ancient Egyptian chronology. Of course discovering the horoscopes was a crucial shift to solve this controversy. That's why there were so many attempts made to find an astronomical solution that could be acceptable to Egyptologists. The fact that two different but clear horoscopes were found in the same temple was extremely promising for determining their correct astronomical solutions. In the case a decoding mistake was made, or if these two horoscopes were simply the products of sculptor's fantasy, the probability of finding two close one to another astronomical solutions, in a reasonable historical time interval, is practically zero. Unfortunately, the whole excitement and fascination with ancient Egyptian horoscopes was slowly forgotten and the opinion that there was no real astronomical meaning hidden in these horoscopes prevailed among historians and all the other attempts to date these horoscopes were abandoned.

A recent picture showing the entrance to the famous Denderah temple is shown on Figure 2.11.

A recently taken photograph of the full view of the Denderah temple is shown on Figure 2.12.

Another example of an Egyptian zodiac, which was painted on the interior of the cover of a wooden sarcophagus, is presented on Figure 2.13. It was discovered during one of his expeditions to Egypt, by famous 19th century German Egyptologist Henry Brugsch. The picture shown on Figure 2.13 comes form his published work [14].

On this zodiac the figure of the "Goddess Nut" is in the center of the picture and the zodiac constellations, which are again very easy to identify, are painted on her both sides. On the left, under her arm, we see the symbols of Cancer, Leo, Virgo, Libra, Scorpio and Sagittarius, and symmetrically on the right, are placed the symbols of Capricorn (with head painted in black), Aquarius, Pisces, Aries, Taurus (painted black) and Gemini. The order of these constellations is correct, exactly like it appears on the real sky. Brugsch noticed some ancient Demotic writings near the constellation symbols on the left. He translated all of them and found out that they

[2] See [4], Vol. 6, p.655-672.
[3] See [15].
[4] See [1].

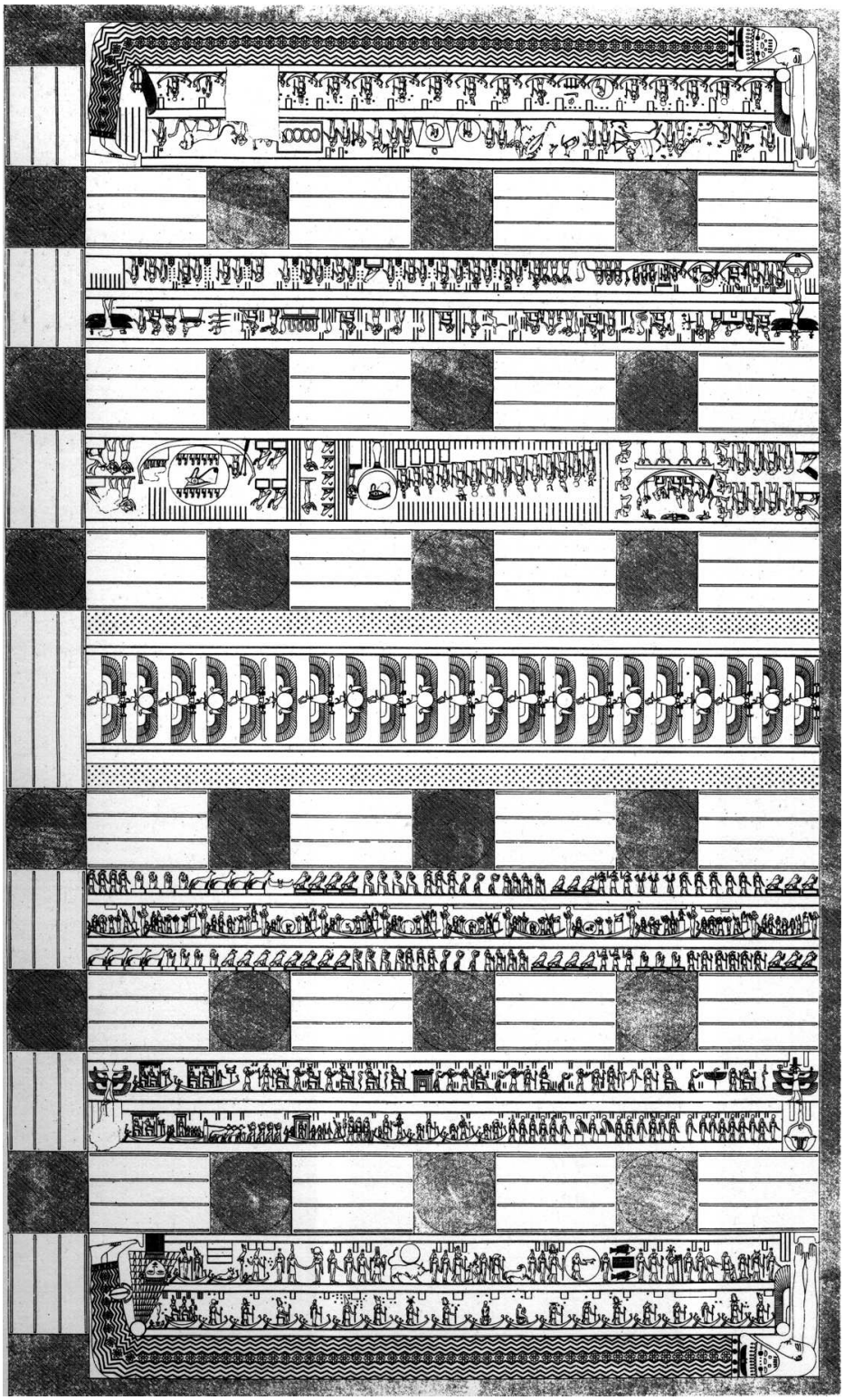

Figure 2.10: *The view of the whole ceiling with the Long Denderah Zodiac.* (Taken from [2], A. Vol. IV, Plate 18.)

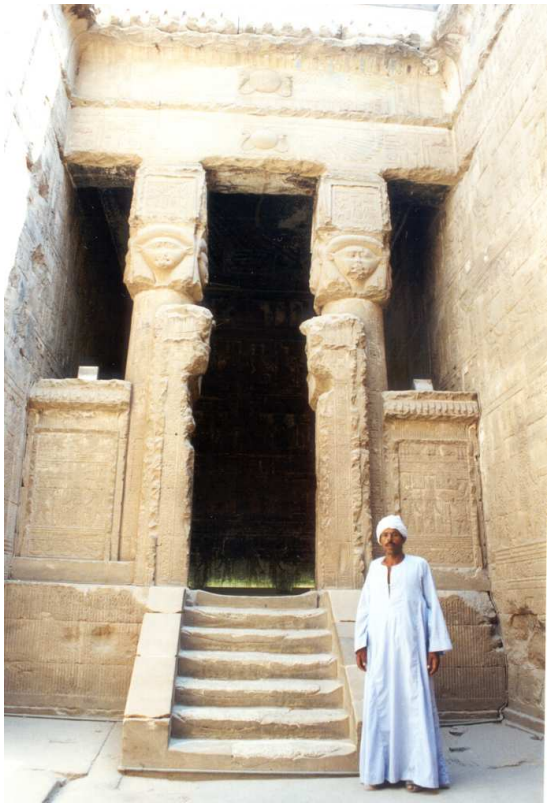

Figure 2.11: *Entrance to the Denderah Temple.*

Figure 2.12: *The Denderah Temple.*

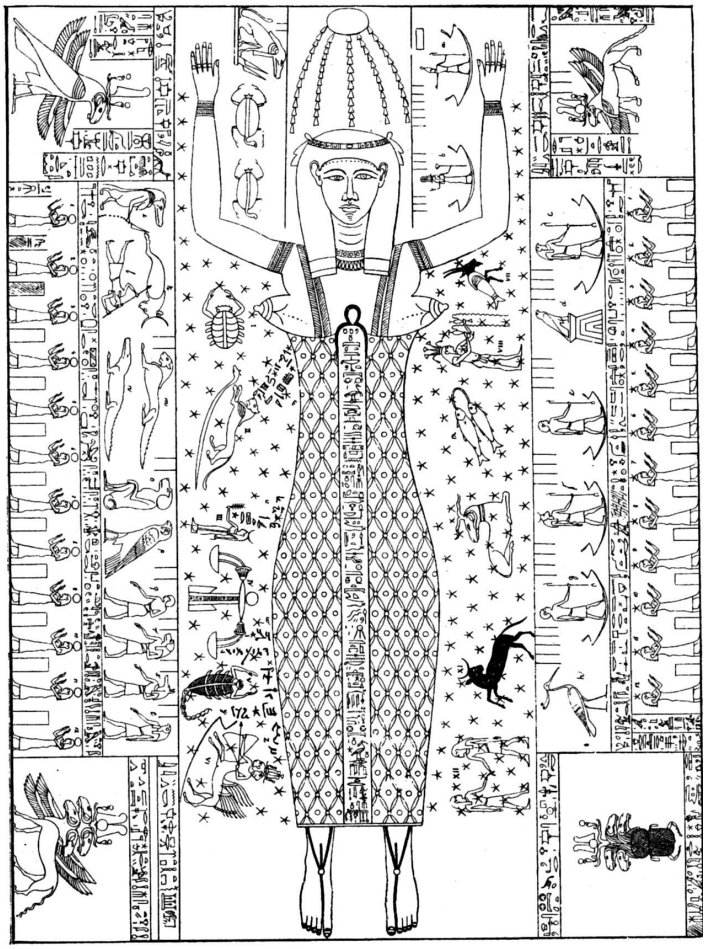

Figure 2.13: *Zodiac painted on wooden cover of an Egyptian sarcophagus discovered by Brugsch in 1857 and published in 1862.* (Taken from [14])

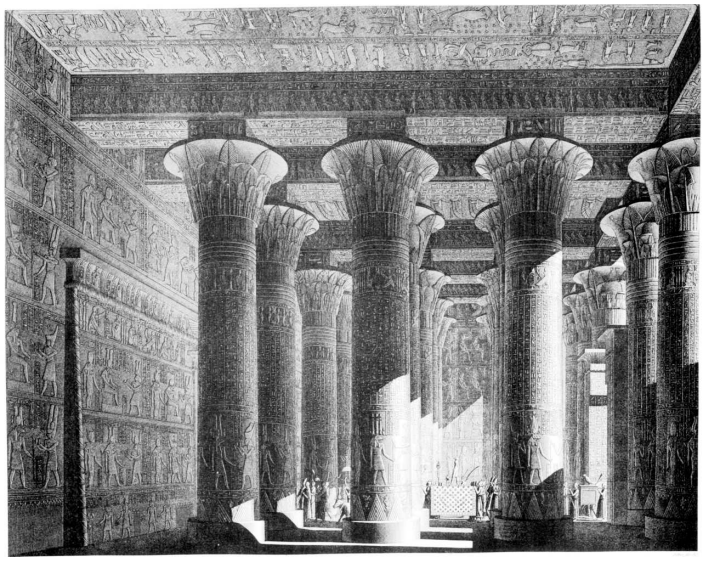

Figure 2.14: *The main hall in the Big Esna Temple.* (Taken from [2], A. Vol. I, Plate 83)

were the names of planets, so a complete horoscope could be identified. As on this horoscope all the planets are marked by annotations, which appear clearly to be made later, we will call it *Annotated Horoscope*. Careful study of this zodiac (see section 8.2) will show that it contains other original horoscopes, which were not noticed by either Brugsch or Morozov.

The first dating of the Annotated Horoscope was done by N.A. Morozov, who obtained a very unexpected result indicating that the horoscope's date was the year 1682. In fact Morozov proved that there are only two possible solutions for this horoscope — the other one was October 18, 1861, but he rejected it as an impossible solution. Indeed, since the pic-

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ture with the zodiac was already published in 1862, so it made no sense for him to assume that the date of the Annotated Horoscope was 1861.

Our next example of an Egyptian zodiac is from the Napoleonic Album. This zodiac was found in a huge temple during the Napoleonic expedition, in an ancient city of Esna located on a bank of the river Nile not far from Denderah. A drawing of the main hall in this Esna temple, which was made by Napoleonic artists, is presented on Figure 2.14. On this picture one can clearly distinguish this zodiac on front part of the ceiling. The detailed drawing (made by Napoleonic artists) of the Esna temple's main hall is shown on Figure 2.15. d

Again, the zodiac constellations are clearly indicated and can be easily recognized. Not surprisingly, the Big Esna zodiac also contains a horoscope as well as some additional astronomical information, which can be interpreted and used to find the precise date depicted on it. We will discuss in detail all the symbols on the Big Esna zodiac later, but right now, we would like to indicate that their meaning appear to be purely astronomical. Of course, at first glance one can have an impression that there could be a mystical denotation behind this picture. Actually, it is a common belief among Egyptologists that Egyptian zodiacs have mostly religious meaning inspired by astronomical phenomena. We will argue that it is not true.

In the same city Esna, there was found by the Napoleonic army another temple with a zodiac (see Figure 2.16). The size of this temple was much smaller and it was badly damaged. Fortunately the condition of the zodiac was rather good except for a missing part around the constellations of Scorpio and Virgo. In order to avoid misunderstandings related to the fact that there are two Esna zodiacs, we will call the second one the Small Esna zodiac but this name has nothing to do with its real size.

The intriguing features of the Small zodiac will be discussed later in this book (see section 7.6), but we can reveal now that its symbols also express the real astronomical events and their unique purpose was to record a certain date. A view of the Small Zodiac is presented on Figure 2.17 and Figure 2.18.

On Figure 2.19, we present a drawing of two zodiacs, which were discovered in 1901 in the city Athribis in Upper Egypt near Sohag, by the well-known Egyptologist W. Flinders Petrie. The zodiacs were located on a ceiling of an ancient Egyptian burial cave and probably indicated the dates related to this interment. These Athribis zodiacs were analyzed for the purpose of astronomical dating by the renown English astronomer A.B. Khnobel, and later by M.A. Vil'ev and N.A. Morozov (see [4], Vol. 6, p. 728-752). However, their decodings of the zodiacs appear to be wrong, which we will prove later. We will also explain the probably reasons of their misinterpretations of the symbols on zodiacs, that led them to the wrong dates. Our computations show that there exists an excellent solution for this pair of zodiacs which perfectly agree with all the symbols, so a unique and definite dating can be achieved.

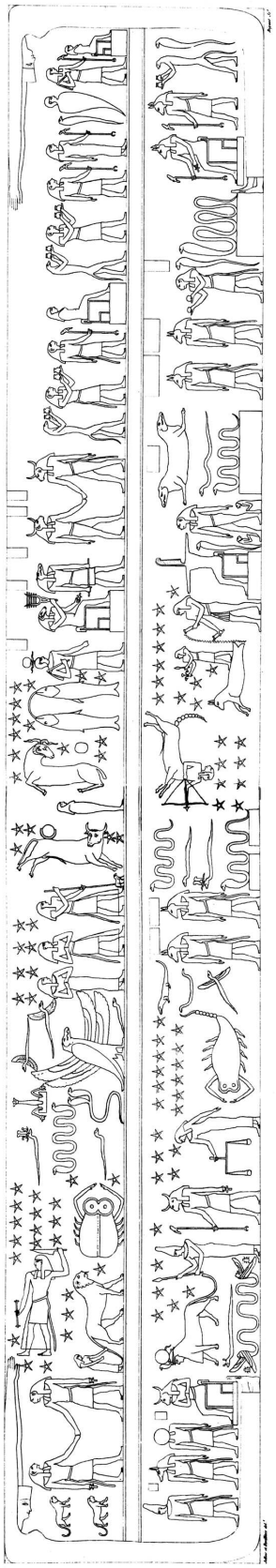

Figure 2.15: *Drawing from the Napoleonic Album showing the zodiac from the Big Esna Temple.* (Taken from [2], A. Vol. I, Plate 79)

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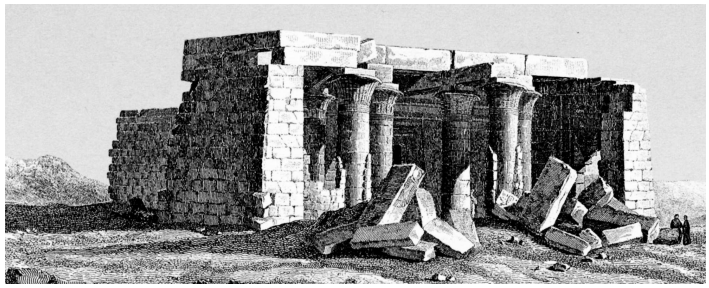

Figure 2.16: *The "Small Esna Temple".* (Taken from [2])

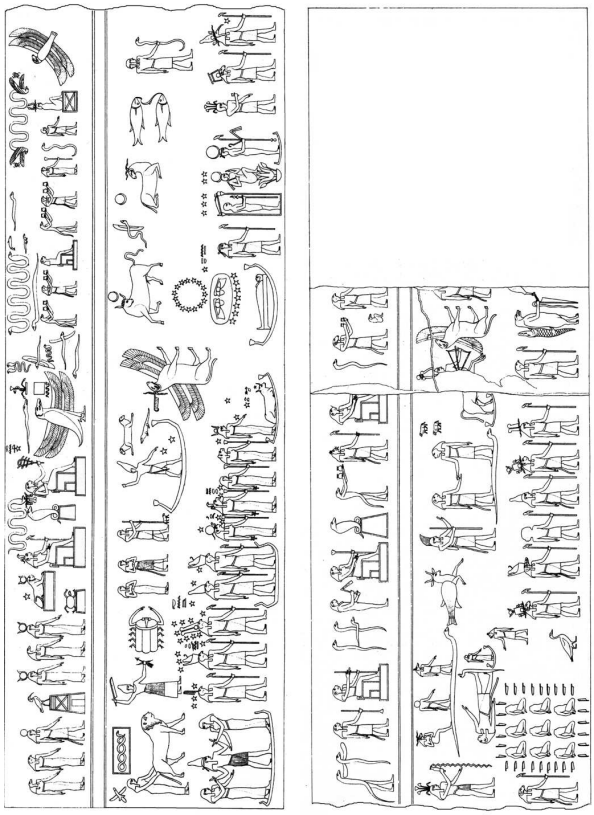

Figure 2.17: *Drawing of the Small Esna zodiac.* (Taken from [2], A. Vol. I, Plate 85.)

Up to the recent times, the computations related to the dating of the Athribis zodiacs were practically beyond human capacity. Only with the use of computers it is possible to carry on the calculations for all possible variants of decodings. The previous researchers, who worked during the first half of the twentieth century, were forced to introduce additional assumptions in order to reduce the amount of computations (which were done by hand). Nowadays, we realize that these additional restrictions were incorrect and consequently the solutions obtained by Khnobel and Morozov were wrong. The reader will find an extended discussion of the symbols of the Athribis zodiacs and their correct dating in the subsequent chapters (see chapter 5 and section 8.1).

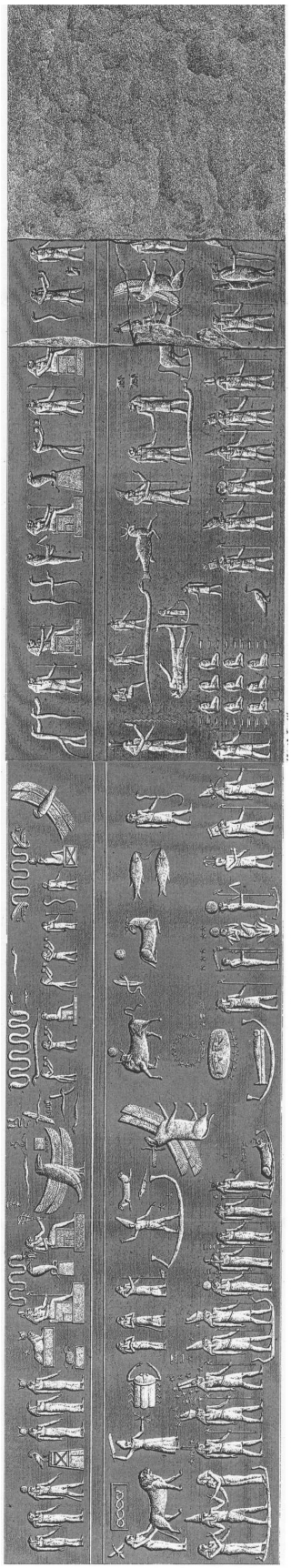

Figure 2.18: *Another drawing of the Small Esna zodiac from the Napoleonic Album* (Taken from [2], A. Vol. I, Plate 87.)

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Figure 2.19: *Drawing of the Athribis zodiacs* (Taken from [24])

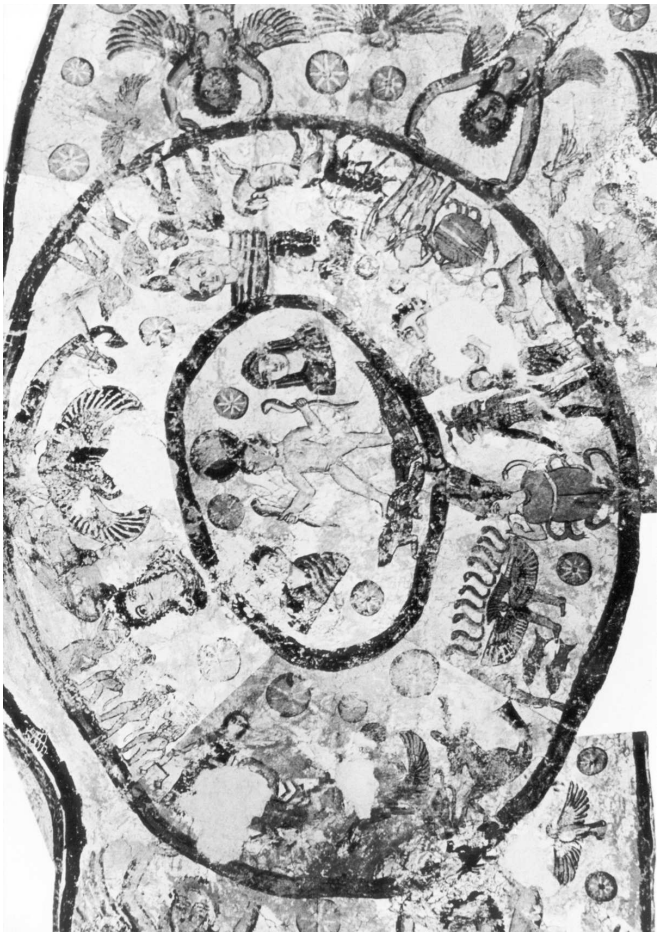

Figure 2.20: *Photograph of the zodiac from the inner room of the Petosiris tomb.* (Taken from [5], Tafel 40)

Two more examples of Egyptian zodiacs are presented on Figures 2.20 and 2.21. Notice that the constellations are shown there using typical symbols, similar as on other Egyptian zodiacs. However, the planets are symbolized by bust portraits (what is quite unusual for Egyptian zodiacs in general). These zodiacs were discovered in the middle of the 20th century in a supposedly ancient Egyptian sepulchre in Petosiris. They were painted on the ceilings of the inner and outer rooms of the tomb.

The dimensions of the whole picture with the zodiac located in the inner room are, 2.12 m $\times$2.62 m.

Both of the Petosiris zodiacs were studied in the paper by O. Neugebauer, R.A. Parker and D. Pingree, in which the authors do not even make any attempt to understand the data as an astronomical record, but assume that the only meaning of these zodiacs is related to Mithraism — an ancient religion. They indicate that the symbols of the zodiacs represent natural forces, physical desire, rationality, intelligence and other metaphysical concepts. The positions of the planets, according to these authors, are determined by some symbolic meaning of planets and constellations in Mithraism without any connection to astronomy. We will dispute this point of view and argue that there is a precise astronomical meaning in both zodiacs. Each of them indicates a certain date. The complete analysis of the astronomical data contained in these zodiacs and their dating will be presented later in this book.

Let us point out that not all Egyptian zodiacs contain a horoscope. Some of them just show the zodiac constellations without any planet. Of course the precise astronomical dating of such zodiacs makes no sense, since there is no sufficient data available.

However, in this situation an approximate zodiac's age can be estimated by comparing this zodiac with other similar zodiacs for which precise astronomical dating can be done. As an example we present in Figure 2.22 a picture of such a zodiac without horoscope.

There are also some examples of old Egyptian zodiac showing less than twelve zodiac constellations, some of which are symbolized by unusual figures. For example, on some old Egyptian zodiacs there was a figure of Raven among the zodiac constellations, what may indicate that different type of division of the ecliptic into zodiac constellations was used in earlier times. Notice, that there is a constellation called Raven neighboring the zodiac Virgo constellation. One of such untypical zodiacs is illustrated on Figure 2.23. This old Egyptian zodiac, which was made of schist, is called "Libyan Palette." There is a little doubt that this palette indeed represents a

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Figure 2.21: *Photograph of the zodiac from the outer room of the Petosiris tomb.* (Taken from [5])

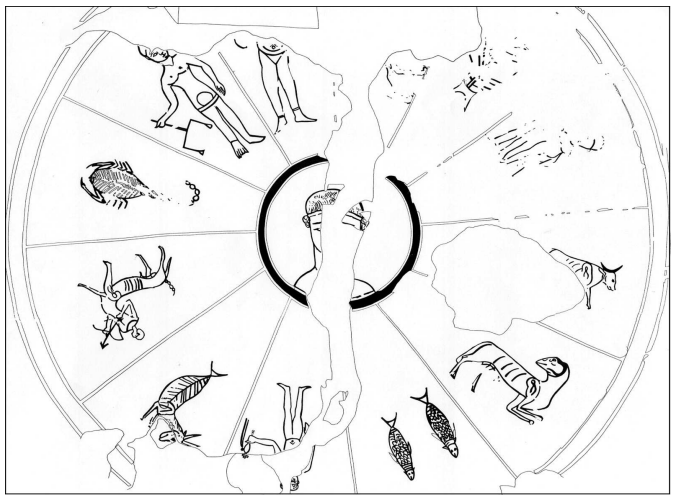

Figure 2.22: *Egyptian Zodiac found in a tomb of Petubasis.* (Taken from [5], Tafel 37)

Figure 2.23: *The Libyan Palette, which is probably an older type of an Egyptian zodiac with unusual constellations.* (Taken from [120], p. 69)

zodiac in spite of its untypical appearance. All the constellations are shown as towns surrounded by walls with constellation symbols placed above them. For instance, one can easily distinguish there Leo and Scorpio. Notice that each of the constellation symbols is holding an astronomical instrument resembling a primitive sextant. A very similar instrument is placed in the right hand of Ptolemy on an old drawing shown on Figure 2.24. As we already mentioned, these older zodiacs could be made at the time when the division of the ecliptic into zodiac constellations was not yet in its final stage, with less than twelve constellations distinguished on the zodiac belt.

2.2 Problem of Astronomical Dating of Egyptian Zodiacs. Why Egyptologists Avoid Astronomical Dating of Egyptian Zodiacs?

We have already explained that if on an old zodiac there are shown planets among the zodiac constellations, or in other words, if there is a horoscope contained in the zodiac, then there is a sufficient evidence to consider this zodiac as a astronomical recording of a certain date. Today with help of modern astronomy and computers, we are able to decipher these dates or at least suggest a few possible variants for such a date. This is, in general the basic idea of the astronomical dating of old zodiacs. This idea is not new. On the turn of the 18th century, when European scientists, following the Napoleonic invasion of Egypt, gained for the first time an access to Egypt, they discovered a number of ancient zodiacs.

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Figure 2.24: *Old portrait of Ptolemy with simple astronomical instrument in his hand similar to the instruments shown on the Libyan Palette.* (Taken from [21], page 8)

When these zodiacs became known in Europe, they immediately attracted a lot of attention by European historians and astronomers, who recognized their definite astronomical character. The scientists realized that this was a unique opportunity to calculate some of the exact dates from ancient Egyptian history. For this purpose there was undertaken an effort to decode the exact astronomical meaning of the zodiacs and calculate their dates. However, all these attempts were conducted under the assumption that the dates hidden inside the zodiacs, should be restricted to the time interval imposed by Scaliger's chronology of ancient Egypt. It seems that the belief in Scaliger's chronology was stronger than the objectivity expected from a proper scientific investigation and the results which did not satisfy the expectations of historians were not even considered as an option. Unfortunately, all the work done did not produce any result. **There was not even one date which was satisfactory from the astronomical point of view and could agree with Scaliger's chronology of ancient Egypt!**

Let us dwell on this subject. First of all, the Egyptian zodiacs displaying typical zodiac constellations, according to prevailing opinion historians, are related to time of the Roman influence in Egypt, i.e. the epoch around the first century A.D. Nevertheless, Egyptologists attempted even to date these zodiacs in much earlier times. For example, the Denderah zodiacs were initially claimed to be made around the year 15 000 B.C.[5]. However, there were too many evident contradictions resulting from such dating. It was incomprehensible why the symbols of the zodiac constellations on ancient Egyptian zodiacs are exactly the same as in medieval European book. The European astrology is considered to have Roman, not Egyptian, origin! The Roman influence expressed in Egyptian zodiacs could not be ignored and forced historians to shift the epoch of probable creation of these zodiacs to the time not earlier than the first century B.C. On the other hand, as the zodiacs were associated with ancient Egyptian remains, historians could not accept their dates later than the third century without revising Scaliger's chronology of ancient Egypt. Consequently, dates of the ancient Egyptian zodiacs, which were acceptable to historians, turned out to be limited to a relatively small interval of few hundred years. Any significant deviation from the dates in this time interval would create serious contradictions with the whole concept of ancient Egyptian chronology and history. Unfortunately for historians, the obtained dates of zodiacs did not fall into this interval. It is very difficult to "stretch" the symbolic interpretation of a zodiac in order to "adjust" the results in such a way that they would fit into the "expected" time interval. The problem is related to the fact that the same horoscope repeats itself usually very rarely — one or two times in thousand years. Many horoscopes repeat only after several thousands of years. Nobody before Morozov had the idea that the time interval considered for the dating of Egyptian zodiacs could be wrong. Actually, accurate and precise astronomical dating of the ancient Egyptian zodiacs can be the best way to determine what should be the correct time interval for Egyptian chronology. Indeed, our computations suggest that the dates of ancient Egyptian horoscopes appear consistently in a specific epoch.

Dissatisfied with the "negative" results of the astronomical dating, Egyptologists practically abandoned the idea of their further dating and declared that these zodiacs were simply astronomical fantasies of ancient artists. Often, they did not even make even the simplest attempt to decode such zodiacs and find their dates. A striking example of such a typical approach can be found in the already mentioned paper of O. Neugebauer, R.A. Parker and D. Pingree, where the authors discuss the Petosiris zodiacs: *"The position of the planets seems to be inspired by Mithraism*[6]*."* As another example, we should mention the book by S. Cauville[7], where the astronomical dating of the Denderah Round zodiac was simply *fabricated* to create appearances of scientific justification for made up by historian dates. The method applied by S. Cauville is absolutely unacceptable form the scientific point of view. We leave a detailed discussion of this book for later.

Not every arbitrary configuration of the planets on a zodiac represents a real horoscope. Planetary configurations on the sky are restricted by some laws. For example, Mercury and Venus are always located not too far from the Sun and consequently in proximity of each other. Clearly an artist creating an imaginary horoscope would most likely violate some of those rules. Some knowledge of astronomy is definitely required to design a "realistic" horoscope, but even in such a case, an inventive artist would most probably produce a horoscope, with the date belonging to a very distant past or future. But all the Egyptian zodiacs, that we studied, always contained flawless horoscopes for which solutions exist in a reasonable period of time. So, it is strange that the authors

[5] See [4], Vol. 6, p. 651.

[6] See [5], p. 100.

[7] See [10].

of [5] instead of analyzing the astronomical content of the Egyptian zodiacs indulge into obscure analysis of would-be mystic meaning of their symbols. Maybe, they realized that there are no astronomical solutions complying with Scaliger's chronology. Indeed, such solutions for the Petosiris zodiacs as well as for all other Egyptian zodiacs do not exist!

As another example, let us examine what is written about the astronomical dating of ancient Egyptian zodiacs in the guide to the Egyptian collection of the British Museum[8]. It appears that there is nothing written about it! When speaking about the dates of the ancient sarcophagi the authors strangely ignore anything related to the astronomical dating of zodiacs painted on these sarcophagi, as it was something with no importance. In all these cases the dating of the Egyptian relics was made without any relation to the available astronomical information. For instance, when describing an ancient Egyptian sarcophagus the authors write: *".. the face resembles the face of the ordinary stone Sidonian sarcophagus, of which those of Tabnith and Eshmunazar, King of Sidon, B.C. 360 ... are typical examples, and for this reason the date of the coffin is supposed to lie between B.C. 500 and B.C. 350*[9]*."* However, a few sentences further, the authors state that: *"... numerous astronomical texts and pictures ... Here we have figures of the gods of the constellations, and of the planets, Signs of the Zodiac*[10]*."*, so it is clear that they are talking here about a zodiac (*the gods of the constellations*) with a horoscope (*the gods of ... the planets*), but they completely ignore the question the astronomical dating of the horoscope. Moreover, there is no picture of the zodiac shown in the guide, what is rather unusual. None of the Egyptian zodiacs referred to in [18], [19], [20], was dated astronomically, and their photographs weren't displayed in the guide either.

Concerning the Denderah zodiac, N.A. Morozov wrote: *"If all these was only a fantasy of an artist, then it's hard to explain why on the both zodiacs Mercury and Venus were located in a near proximity of the Sun, as they should be, and not in some other place which was more convenient for the artist but not possible for a real horoscope. What possibly would be a purpose for such a fantasy? No, it is not a fantasy but a horoscope.*[11] Morozov was the first who suggested to date the Egyptian zodiacs according to their astronomical meaning without restrictions dictated by Scaliger's chronology.

Before Morozov all the investigators of the Egyptian zodiacs were struggling to obtain the solutions postulated by historians belonging to the time interval around the first century A.D. Of course the obtained results couldn't satisfy the expectations of historians and even with drastic "adjustments, " it still was impossible to use these zodiacs to support Scaliger's chronology. Strangely, after the works of Morozov were published during the years 1915–1935, Egyptologists abandoned all the honest attempts to use the astronomical methods to date the Egyptian zodiacs. One could say, that it happened when it became clear that the astronomical dates of these zodiacs do not give any date supporting the Scaliger version of the conventional chronology of Egypt! It seems that the direct impact of the Morozov's work was the change of the attitude of Egyptologists concerning Egyptian zodiacs who now try to overlook the astronomical information while discussing their meaning only. They try to divert this discussion away from the chronological issues to "safer grounds" of ancient Egyptian religions. They try to convince us that if there is any connection between Egyptian zodiacs and astronomy, then it is something very primitive and naive based rather of imagination than reality[12].

Figure 2.25: *Russian Academician N.A. Morozov (1854–1946).*

The research of N.A. Morozov, and more recently of A.T. Fomenko and his collaborators[13], prove that Scaliger's chronology does not have solid foundations and that there are serious problems and contradictions in it (see section **??**). It is not the purpose of this book to investigate all the aspects related to Scaliger's chronology. We refer the interested readers to the existing literature on subject, in particular to [179], or [103], [104], [105], and [106]. However, as we have already explained our reasons in Chapter 1, in our study of the Egyptian zodiacs, we do not feel any bond to be restricted by Scaliger's chronology. Being ourselves researchers, we strongly feel that the scientific objectivity oblige us to abandon any pre-conceived ideas related to expected in this area results.

In order to find *all possible dates* that could be indicated on the Egyptian zodiacs, we have carried the astronomical computations in the extended time interval, from 500 B.C. till 1800 A.D. However, this approach led to some new se-

[8] See [18], [19], [20]
[9] See [18], p.133
[10] See [18], p.133.
[11] See [4], Vo. 6, p. 653.
[12] See [5],[9].
[13] See [103]

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rious problems. By considering such a long time interval, we allow many of the horoscopes to repeat. Consequently, even in the case of an unquestionable decoding of a horoscope we will in general have to deal with its several possible dates. *Which of these dates is correct and what are the criteria for choosing the right solution?* In fact, decoding of Egyptian horoscopes can be tricky because of the ambiguities related to the positions of some planets. For example, an unusual symbol may be used to indicate a planet or its position may not be completely clear from the picture. Sometimes, parts of a zodiac are lost, damaged or are in very poor condition. For some zodiacs with extremely complicated design or large number of unusual symbols, it is necessary to consider all possible variants of planetary identifications. Consequently, in some cases, depending on the chosen variants of decodings, dozens of possible horoscopes have been investigated. In such cases, there may be hundreds of dates obtained. Even, for the zodiacs with clear and definite meaning of its symbols, there can still be two or more variants of horoscopes possible. Therefore, it is important to look for additional astronomical information in the zodiac, and use it to select the correct date. Fortunately, such information is available and will be discussed in this book. We should emphasize that none of the previous investigators realized the existence of this information, so their results can not be treated as final.

2.3 Our New Approach to Dating Egyptian Zodiacs

Difficulties, that were described in the previous section 2.2, can be removed by using our new method of decoding and dating ancient Egyptian zodiacs. Namely, we adopt a formal routine to decode not only horoscopes contained in Egyptian zodiacs but also additional astronomical information frequently included in these zodiacs. Let us point out that usually there is enough of additional information to eliminate all incorrect solutions and determine the date of the zodiac uniquely.

When dealing with zodiacs, there is always some uncertainty in decoding, which may lead to several variants of admissible horoscopes. But even in such ambivalent situations we are still able to establish the unique *true solution*. Of course, in a case when some errors were made in decoding of a horoscope, the calculated solutions could not agree with the additional astronomical information, what would result in elimination of all these solutions. In fact, the amount of all the astronomical information contained in many Egyptian zodiacs is so large that it makes improbable that it could randomly reflect a real astronomical situation.

The novelty of this method lies in the fact that we can consider simultaneously all the possible decoding variants for a zodiac. This was not possible in previous attempts because the large number of the obtained results could not be reduced as the additional astronomical information was not properly understood. Consequently, the previous researchers were forced to choose only one variant of a decoded horoscope and to work with it. However, this new idea do not come without a price. With each additional variant of a horoscope the amount of necessary computations increases sharply and the number of possible solutions can be very large, sometimes more than hundred. Every solution should be inspected and compared with the additional information on the zodiac. This procedure could not be competed without using computers and appropriate astronomical software. For our purposes, we had to develop a special astronomical program called *"Horos"*, which finds for a particular planetary configuration (i.e. a *horoscope*) all the possible dates when such an arrangement of planets really appeared on the sky. This program has also ability to verify the order of the planets on the ecliptic and compare it with their order in the horoscope. Even in the case there is some doubt about the exact positions or order of some of the planets, the program "Horos" is still able to process such a data. The description and examples on how to use the program are included in the Appendix. The program itself, can be downloaded from web site at: `http://krawcewicz.net/downloads.htm`, `http://www.math.ualberta.ca/~wkrawcew/downloads.htm` or http://www.pims.math.ca/pi/downloads. We have also used the program *"Turbo Sky"* developed by Russian astronomer A. Volynkin, from the Astronomical Institute of Moscow State University. With its help we were able to determine the brightness of specific planets and other conditions, which are important to establish their visibility at a given date and location in Egypt. This information is important for the verification of possible solutions for Egyptian zodiacs. Let us explain that brightness of a planet varies depending on its distance from the Sun and its position with respect to the Sun and the Earth.

2.4 Pictures of Egyptian Zodiacs used for Dating in this Book

Investigation of an Egyptian zodiac for the purpose of astronomical decoding requires the most careful analysis of its smallest details. Our study of Egyptian zodiacs shows that some of the details, which at the first glance may seem to be unimportant, in fact are crucial for the correct decoding of the zodiac's astronomical meaning. Therefore, the astronomical dating should be done based on the most accurate and detailed pictures of the zodiacs.

The most valuable are the large and detailed color photographs, but unfortunately we are not able to find many of them. It turned out that acquiring good photographs of some, even very famous Egyptian zodiacs, was an extremely difficult task. On one hand Egyptologists profess that all these zodiacs are nothing else than pure fantasies, and on the other hand, only very few detailed images of these zodiacs, which are good for astronomical dating, were ever published. In many cases, when such photographs are available, they are either of a very low quality or show only a part of a zodiac making decoding impossible. There are some exceptions but they are very unique. See for example Figure 2.26, where there are visible only the symbols of the constellations while the planets may

Figure 2.26: *Photo of an Egyptian zodiac painted on a cover of a coffin. Planets are not visible.* (Taken from [120], page 117)

the Louvre museum by Prof. Y.V. Tatarinov. These photos were very helpful in our work and we are grateful for it to Prof. Tatarinov.

In June 2002, one of the authors — Gleb V. Nosovsky, joint the expedition to Egypt, organized by the producers of the Russian TV series "*Unknown Planet*." He had a rare opportunity to take several photographs of the Long Denderah zodiac, the copy of the Round Denderah zodiac, the Big Esna zodiac, in their present condition. Additional photographs, on the request of the authors, were taken by the professional photografer Y.L. Maslaev, who accompagnied the expedition. All the details of these zodiac were documented and compared with the drawings from the Napolenonic Album.

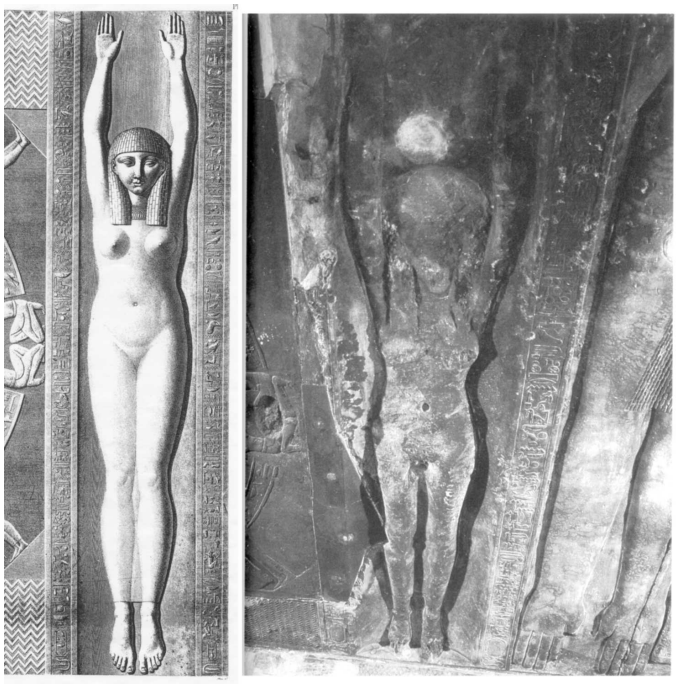

Figure 2.27: *"Goddess Nut" in the Napoleonic Album and on an actual photo.*

be hidden in shadow. It is difficult to avoid an impression that the specialists in Egyptian history seek to hide these evidence which could contradict their version of the Egyptian chronology. Up to the beginning of the twentieth century, when it was still unclear what are the dates behind Egyptian zodiacs, there were many publications containing high quality and detailed images of such zodiacs. For example, the Napoleonic Album (see [2]) contains several large beautiful pictures of Egyptian zodiacs[14]. As the reader can find out from this book, most of the pictures of Egyptian zodiacs, which are usable for the astronomical dating, were taken from old publications. For our purposes we also used several photographs of the Round Denderah zodiac, which were taken in 2000 in

Regarding the drawings of Egyptian zodiacs included in the Napoleonic Album [2] we have to make few remarks. Notice that the artists who prepared this album took a lot of care to produce a very high quality and exact in every detail pictures of almost photographic accuracy. We have to admit that in the most cases they were able to achieve this goal, however, in the same time they tried to improve the figures by making them more beautiful than the originals in style of the 18th century art. Therefore, we should not trust these pictures and treat them equally to photographs. In particular, these pictures do not reveal the real spirit of the Egyptian art.

After comparing them with the actual photographs we discover that the originals are more crude and plain than these drawing. On Figure 2.27 we compare two images of the

[14] See also [24] and [14].

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Figure 2.28: *The same fragment of the Round zodiac in the Napoleonic Album and on a photo.*

Figure 2.29: *Fragment of the Long Denderah zodiac. Photograph taken by G.V. Nosovsky in 2002*

Figure 2.30: *Another fragment of the Long Denderah zodiac. Photograph taken by G.V. Nosovsky in 2002*

"Goddess Nut" from the Round Denderah zodiac, one from the Napoleonic Album, another a recent photo. It is evident that in the Napoleonic drawing this female figure is looking much like an 18th century beauty, but in the same time, her pose and position are displayed very accurately. Let us notice that on the original relief, the "Goddess Nut" is naked while on the Napoleonic drawing she appears dressed in a transparent attire, which however was made to be imperceptible as much as possible. Nevertheless, her face is most probably a pure fantasy of the artist who made this drawing. On the original there is only a contour of a completely unrecognizable face.

On Figure 2.28 we compare the same fragment of the Round Denderah zodiac on a modern photograph and on a drawing in the Napoleonic Album. Notice that the drawing

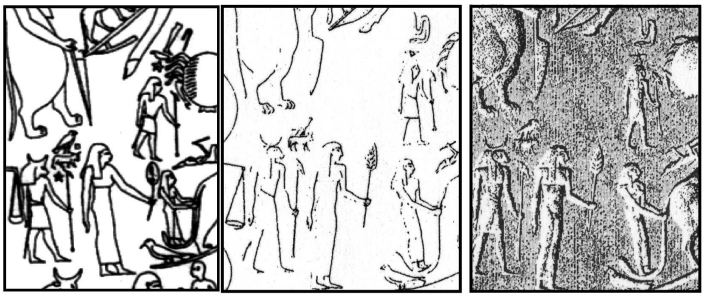

Figure 2.31: *Example of some exceptional mistakes in the Napoleonic picture of the Round Denderah zodiac. On the left modern drawing based on a photograph, in the middle and on the right two drawings from the Napoleonic Album*

is highly precise, nonetheless the figures on the drawing are clearly improved. For example, the faces of the figures on the drawing exhibit more details than they really have on the original. No doubt that they were made more beautiful.

We would like to point out that there are some errors in the Napoleonic Album, which at the first glance may seem to be inessential but in fact can be crucial for the correct decoding of the zodiac. On Figure 2.31 we present a fragment of the Round Denderah Zodiac on three different pictures. On the left, there is a precise modern drawing, made based on a photograph, followed by two pictures of the same fragment from the Napoleonic Album. Notice that the male figure with a walking stick in the center of the picture should touch with his feet the top of the spike held in the hand of Virgo. This detail is very important for the exact understanding of the astronomical meaning of the whole composition.

Figure 2.32: *Photograph of a fragment of the Round Denderah zodiac.* (Taken from [9], p.165)

On Figure 2.32, we present a photograph of the same fragment from which one can see its exact appearance on the

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Round Denderah zodiac. In Figure 2.31, the modern drawing[15], shown on the left, seems to be very precise. Therefore, we have decided to conduct our analysis based mostly on this drawing. However, we also verified all the details on the photographs made by Prof. Y.V. Tatarinov.

Figure 2.33: *Fragment of the Round zodiac from the Napoleonic Album.*

There is another important detail which was altered in the Napoleonic Album. Look at Figure 2.33 showing a part of the same fragment as in Figure 2.31 taken from the Napoleonic Album. The figure in the center with a walking stick represents a planet. Over it's head there is star and above it there is a curved snake.

However, on the original zodiac in that place there is no symbol of a snake, but instead, there are three hieroglyphs (see Figure 2.34).

The meaning of the three hieroglyphs[16] is in fact the name "SBK" standing for *"Sebek"*, which according to Brugsch is the Egyptian name of Mercury[17]. Notice that in ancient Egyptian hieroglyphical writing there were no vowels. We didn't have access to many modern photos of other Egyptian zodiacs, but fortunately their composition is less complicated than the Round zodiac and we trust that the Napoleonic pictures are reliable copies. For example, the Long Zodiac on the Napoleonic picture seems to be very precise, however, some

[15] Taken from [10], p. 71.
[16] See [109]
[17] See [4], Vol. 6, p. 697.

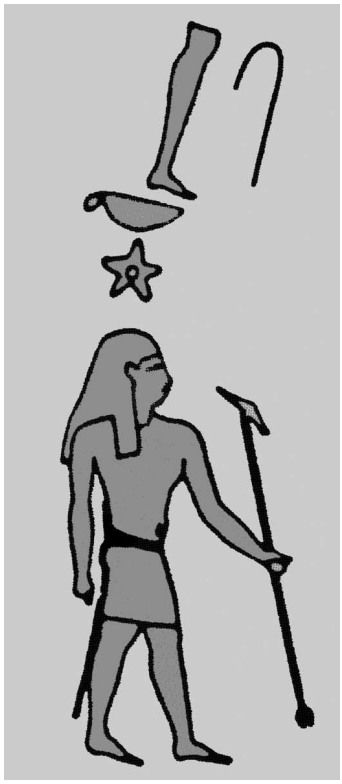

Figure 2.34: *Fragment of the Round zodiac.* (Taken from [10], p. 29)

minuscule differences still can be identified. On Figure 2.35, we compare a fragment of the Long zodiac with its representations taken from the Napoleonic Album. From this figure we can conclude that in general the Napoleonic picture of the Long zodiac is highly precise. Nevertheless, it's possible to list several minor differences:

- Over the head of the first female figure standing on the right from the sign of PISCES there is a rectangular frame. Inside this frame on the original, there is a falcon head which is missing in the Napoleonic picture.
- Over the head of the female figure standing on the left from PISCES there is a symbol of a star. This symbol which is not so noticeable was omitted on the Napoleonic picture. Maybe the artist was not able to recognize this symbol.
- The rectangular frame above the head of the male figure with a walking stick (on the right from PISCES) there is a symbol of falcon, but on the Napoleonic picture there is a bird definitely different than falcon.
- The same male figure is holding in his right hand an Egyptian cross with handle. This cross is also omitted on the Napoleonic picture.

Drawings of the both Esna zodiacs were included in the Napoleonic Album. In 2001, at the time we were dating the Esna zodiacs for the first time, we were not able to find other pictures or photographs of these zodiacs, and we were forced

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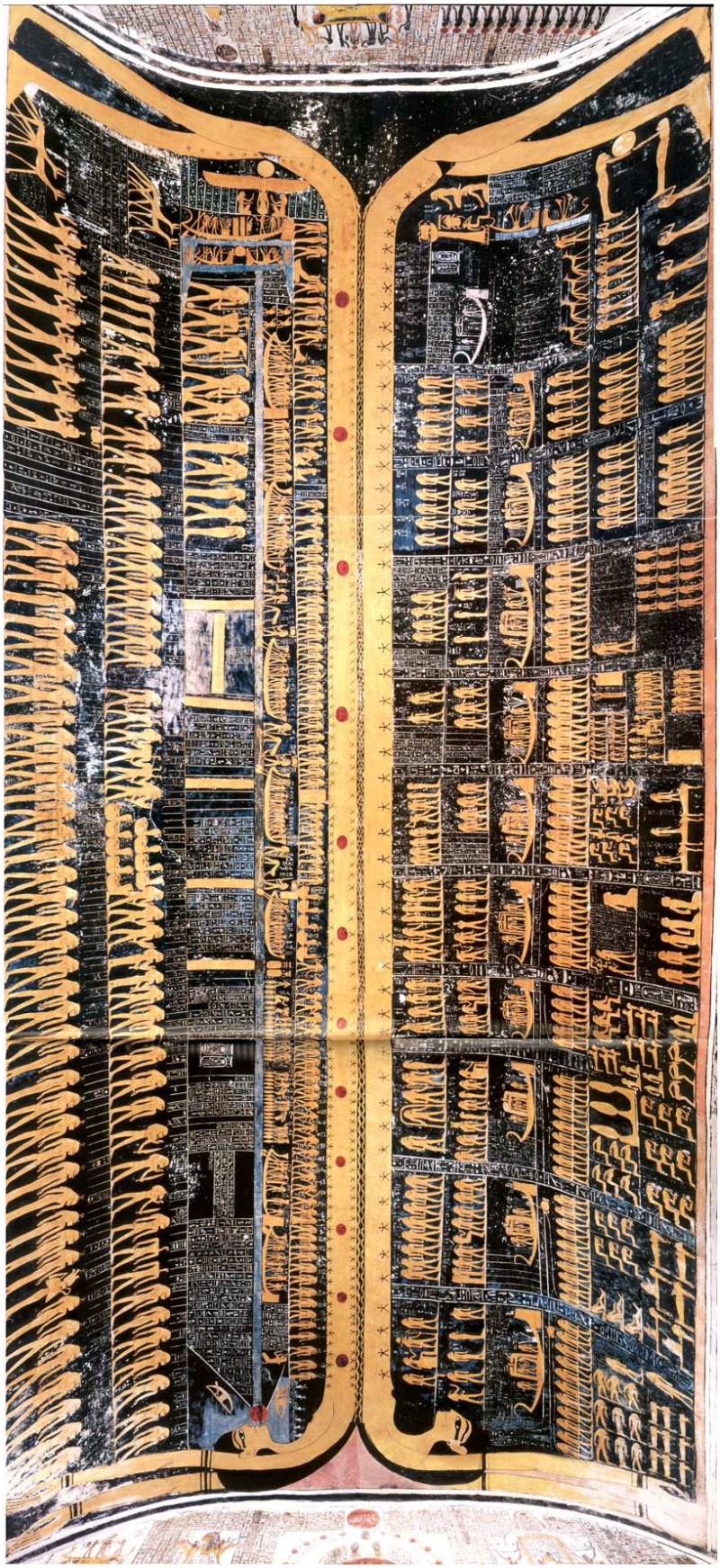

Figure 2.36: *A photograph of a zodiac from the tomb of Ramses VI in the Valley of the Kings in Egypt.* (Taken from [32], p. 128-129)

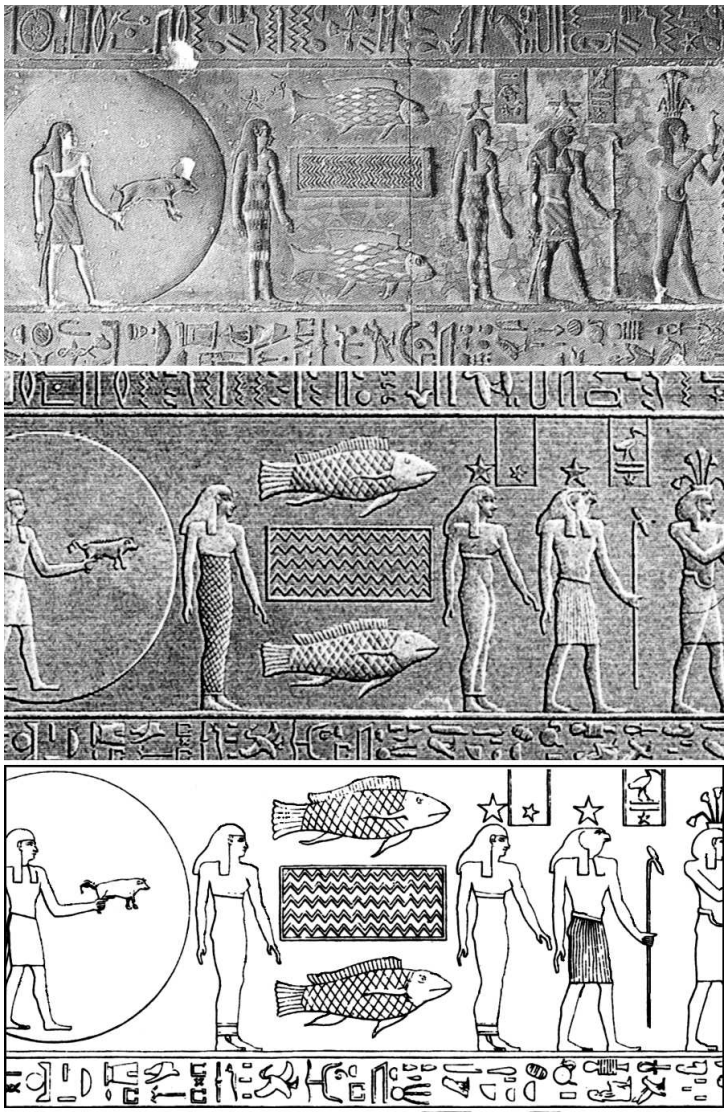

Figure 2.35: *A fragment of the Long Denderah zodiac on a modern photo* (taken from [10], p.37) and the picture from the Napoleonic Album (taken from [2], A. Vol. IV, Plate 20)

to trust the drawings from the Napoleonic Album. After comparing them to the photos taken by G.V. Nosovsky, several differences were discovered. However, they did not result in changing the final date for this zodiac that had been established earlier. In fact, with the new details available, we were able to reconfirm the accuracy of the obtained earlier solution (see 7.6) and clarify some ambiguities related to the earlier decoding of the Big zodiac.

The corrected drawing of the Big Esna zodiac, based on the picture from the Napoleonic Album, is shown on Figure 2.37.

Let us discuss briefly the imperfections of the Napoleonic drawings of the Big Esna zodiac.

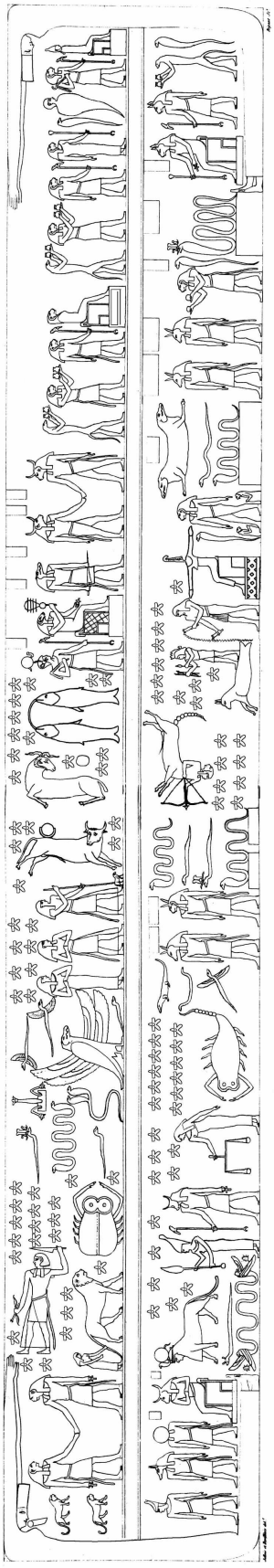

Figure 2.37: *Corrected drawing of the Big Esna zodiacs. The changes were made based on recent photos of the zodiac.*

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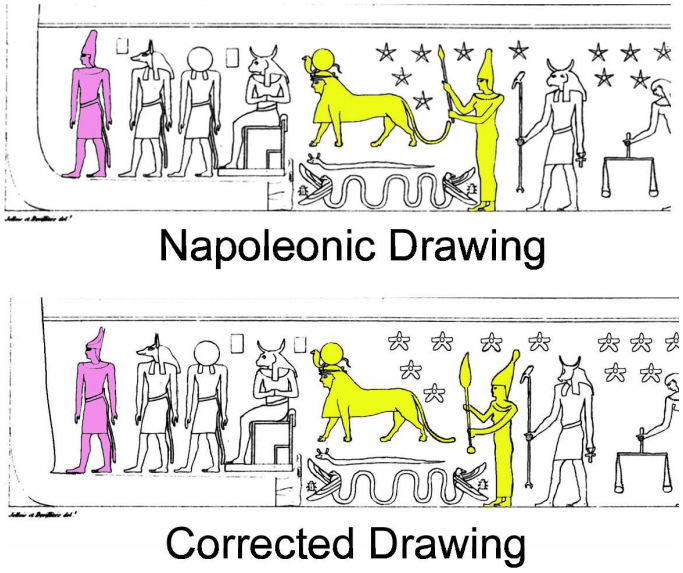

Figure 2.38: *Details on the Napoleonic drawing of the Big Esna zodiac near the constallation of Virgo and their corrections.*

- Virgo on the Napoleonic drawings clearly touches the tail of the lioness with a human head (see Figure 2.38). The way it is shown here is missleading, because on some other Egyptian zodiacs Virgo is touching Leo's tail. But, the lioness' symbol is not related to Leo — it belongs to a partial horoscope. The photographs of this fragment of the zodiac revealed that these two symbols were clearly apart.

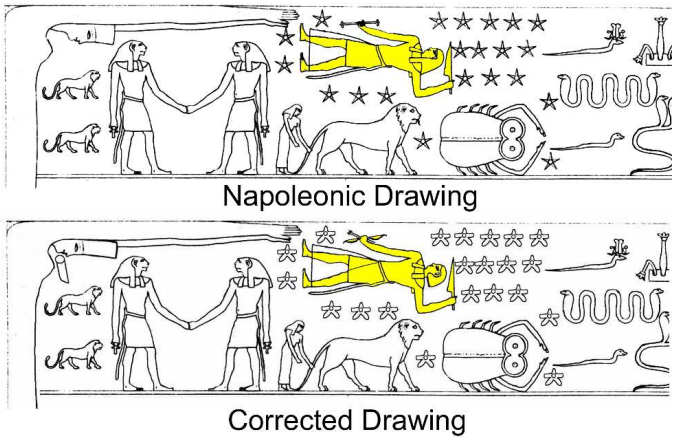

Figure 2.39: *Details on the Napoleonic drawing of the Big Esna zodiac near the constallation of Leo and their corrections.*

- Male figure holding a knive over his head, located in a horizontal pozition over the constellation of Leo. In the other hand of this figure one can see a mace on the Napoleonic drawing and a bow and arrows on the photo (see Figure 2.39).

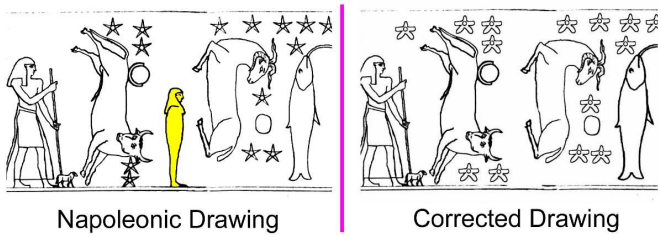

Figure 2.40: *Details on the Napoleonic drawing of the Big Esna zodiac near the constallations of Aries and Taurus and their corrections.*

- On the Napoleonic drawing, between Aries and Taurus, there is shown a human figure (see Figure 2.40), while on the photos there is nothing between these two constellations. This fragment of the zodiac was hidden behind a column inside the temple, which could explain the mistake made by the Napoleonic artist.

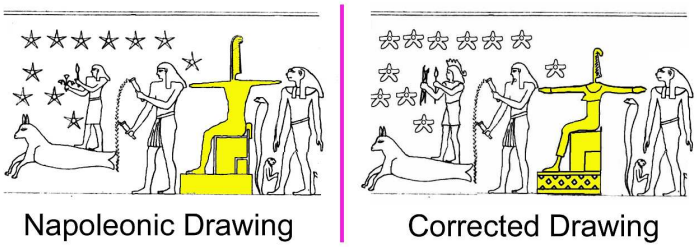

Figure 2.42: *Details on the Napoleonic drawing of the Big Esna zodiac on the right from the constallations of Aquarius and their corrections.*

- On the Napoleonic drawing, there two sitting female figures on the right from Pisces. These two figures look differently on the photos and the second one is definitely a male figure (see Figure **??**).
- On the Napoleonic drawing, there is a sitting male figure on the right from Aquarius. However, the photographs of this fragment of the Big zodiac clearly indicate that this figure should be female (see Figure 2.44).
- Male figure standing on the right from Pisces is shown on the Napoleonic drawing without planetary walking stick, which should be there (see Figure 2.45).

In summary, let us reiterate that in principle the Napoleonic pictures are sufficiently precise for our purpose of astronomical dating. Of course one should keep in mind that these drawing are not originals but only copies which are excellent but still not flawless. As we indicated, some small and

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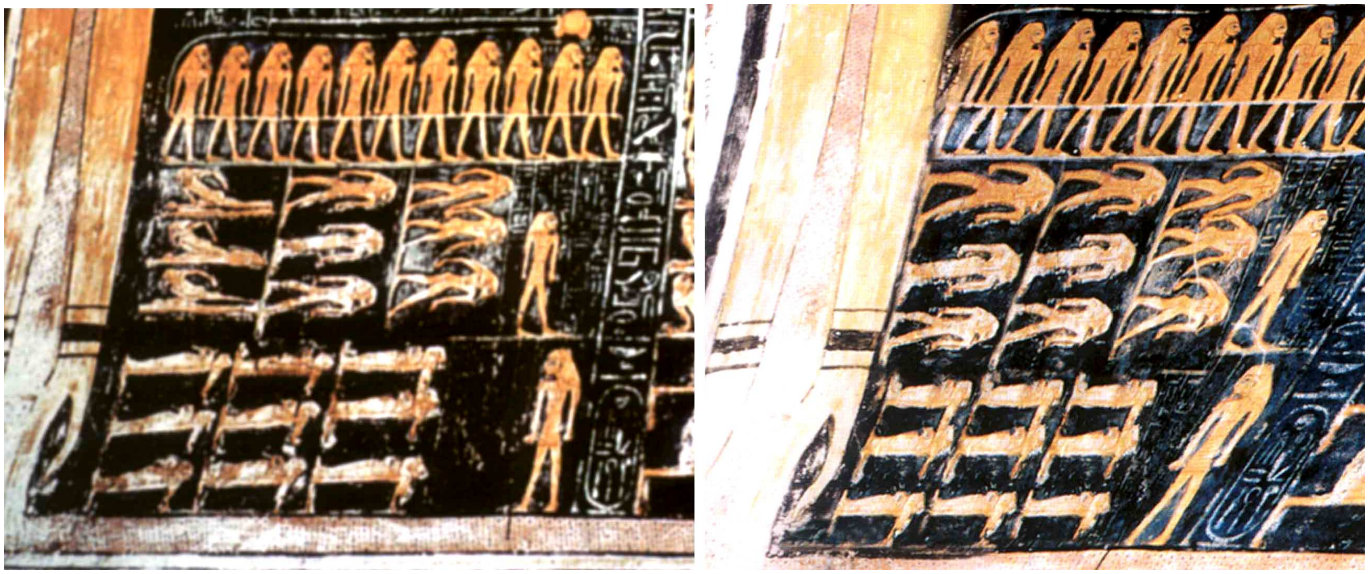

Figure 2.41: *Alternations made on a photograph of Ramses VI zodiac.* (The left fragment was taken from [31], pp. 128–129, and the right one from [115], pp. 262–265)

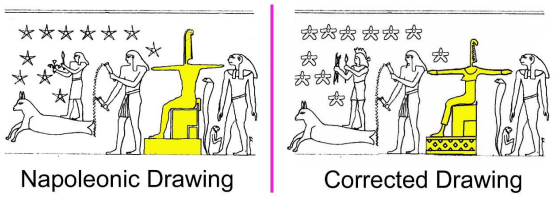

Figure 2.43: *Details on the Napoleonic drawing of the Big Esna zodiac on the right from the constallations of Aquarius and their corrections.*

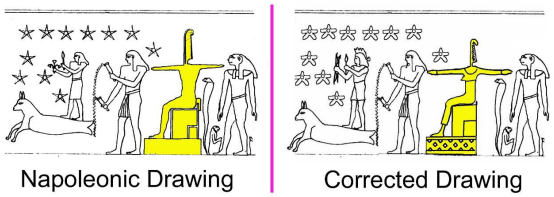

Figure 2.44: *Details on the Napoleonic drawing of the Big Esna zodiac on the right from the constallations of Aquarius and their corrections.*

hardly noticeable details may be altered or omitted on these copies but clearly the artist did not contribute new symbols out of his own imagination.

Finally, it may sound strange, but we discoverred that it is not possible to trust even the published photographs of the Egyptian zodiacs. On Figure 2.41 we show details on two photographs of the Ramses VI zodiac. The first photograph was taken from [31], pages 128–129, and the second photograph was taken from [181], pages 162–165. Notice that these two pictures show different figures on the zodiac. In fact one of these photographs was clearly tampered with. Fortunately, these detailes were not crucial for the astronomical dating of the Ramses VI zodiac (see section 8.5).

2.5 Our Abbreviations for Egyptian Zodiacs

Sometimes, it will be convenient for us to use short abbreviations when referring to the Egyptian zodiacs analyzed in this book. In particular, we will use these abbreviations to make clear at the first glance fragment of what zodiac is displayed in a figure. The following is the list of these abbreviations:

- (DL) – **the Long Denderah zodiac (Fig. 2.8)**
- (DR) – **the Round Denderah zodiac (Fig. 2.6)**
- (EB) – **the Big Esna Zodiac (Fig. 2.15)**
- (EM) – **the Small Esna zodiac (Fig. 2.17–2.18)**
- (AV) – **the upper Athribis zodiac (Fig. 2.19, top one)**

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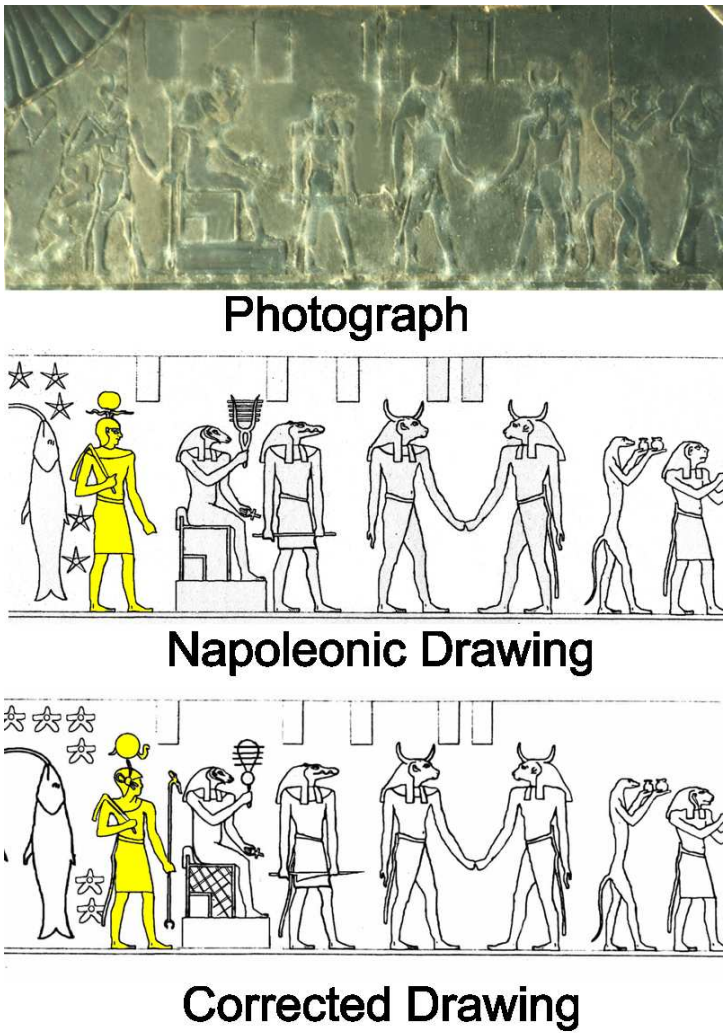


Figure 2.45: *Details on the Napoleonic drawing of the Big Esna zodiac next to the constallations of Pisces and their corrections.*

(AN) – **the lower Athribis zodiac (Fig. 2.19—bottom one)**

(OU) – **the zodiac painted inside the tomb of Ramses VII (Fig. 2.3)**

(P1) – **the zodiac from Petosiris tomb from the outer room (Fig. 2.21)**

(P2) – **the zodiac from Petosiris tomb from the inner room (Fig. 2.20)**

(BR) – **the Brugsch's zodiac (Fig. 2.13)**

(LZ) – **the zodiac from papyrus (Fig. 2.1)**

(RM) – **the zodiac from the tomb of Ramses VI (Fig. 2.36)**

Chapter 3

Previous Attempts of Astronomical Dating of Egyptian Zodiacs

3.1 History of Dating of the Denderah Zodiacs

The first attempts to astronomically date the Round and Long Denderah zodiacs took place in the 19th century following their publication in Europe. Some variants of their decoding were suggested by Egyptologists of that time, in particular by famous German Egyptologist Henry Brugsch. His decoding was based on the interpretation of the figures and his translations of the inscriptions which were placed above some of the figures symbolizing planets. It was quickly observed that on the Denderah zodiacs, as well as on other Egyptian zodiacs, all the planets, except the Sun and Moon (which in the ancient astronomy were considered as planets), were usually shown as travelers with walking sticks. Planets in ancient astronomy were regarded as "moving stars[1]." Let us notice that even in English the world *planet* originated from the Greek word *planets* – $\pi\lambda\alpha\nu\eta\tau\eta\zeta$ which means *wanderer* or *traveler*, so it is not surprising that the planets on Egyptian zodiacs were also symbolized by figures representing travelers. On the other hand the Sun and the Moon were represented on many Egyptian zodiacs in form of circles, sometimes with figures inside[2], and this was exactly the way they appear on the Denderah zodiacs. This initial decoding of Egyptian zodiacs was later improved by N.A. Morozov[3], who among the other things, corrected mistake of Brugsch in identification of Venus what we will discuss in details below. As we've already mentioned in Chapter 1?, on the basis of the initial decoding suggested by Brugsch and other Egyptologists, many renown astronomers of the nineteenth century struggled to date these two zodiacs. The result of their computations did not yell any acceptable date for the Denderah zodiacs from the very ancient times till the third century AD.[4] The computations for the later epochs were not carried on until N.A. Morozov began his investigations of the Denderah zodiacs in the 1920s.

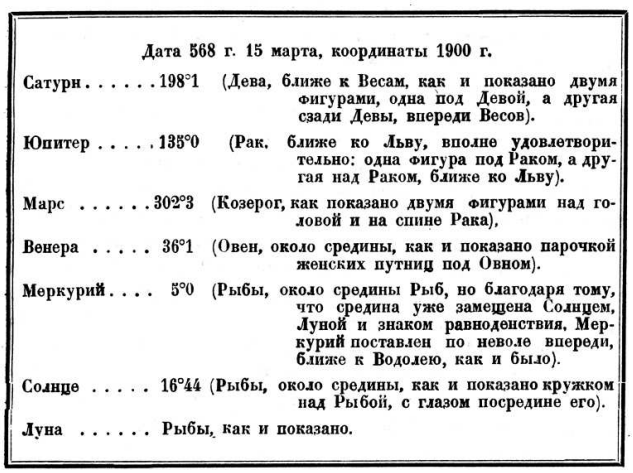
N.A. Morozov, who was a prominent expert in the ancient and medieval astronomical symbolism, once more checked thoroughly the decoding of the Denderah zodiacs which was suggested by Egyptologists. In several instances he found and corrected some mistakes but in general he confirmed the accuracy of their decoding. We are going to discuss in detail all these decodings of the Denderah zodiacs. In principle, Morozov followed the same approach to study the Egyptian zodiacs as his predecessors, what resulted in their incomplete decoding. Our research proves that N.A. Morozov didn't realize, overlooked or misunderstood a significant amount of astronomical information usually included in the Egyptian zodiacs aside of the main horoscopes. Morozov, like his predecessors, was absolutely sure that the all astronomical contents of an Egyptian zodiac was limited to only one horoscope. It was a mistake.

[1] See [27], p.40
[2] See [4], V. 6, p. 652-655.
[3] See [4], Vol. 6, p. 651-672.
[4] See [4], Vol. 6, p. 651.

After verifying and improving the decoding of the Denderah zodiacs, Morozov undertook the task of computing their dates. Contrary to his predecessors, he was sceptical about the conventional Egyptian chronology, and extended his calculation to cover the middle age dates as well. His efforts paid back. He found a beautiful pair of solutions for the Denderah zodiacs, which, unlike all the previously obtained results, really agreed with these zodiacs. His solutions were:

The Long Denderah zodiac: **May 6, 540 AD.**
The Round Denderah zodiac: **March 15, 568 AD.**
(N.A. Morozov[5])

Let us point out that during Morozov's time the computations had to be done by hand, so there was great risk that some mistakes could be made leading to the wrong results. The renowned astronomer N.E. Edelson carried out a detailed verification of Morozov's calculations and obtained the planetary positions which were very close to the positions determined by Morozov. Today, even the most elaborated computations do not constitute a problem anymore. With the use of fast computers we can obtain the precise results just in seconds. With the use of the astronomical software *Turbo Sky*



Дата 568 г. 15 марта, координаты 1900 г.

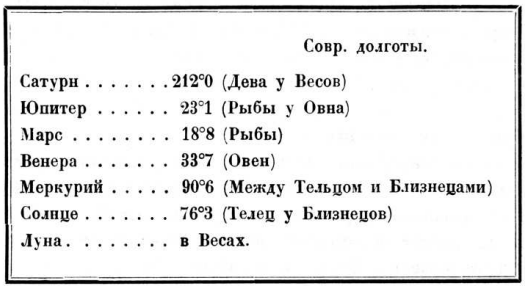
Сатурн	198°1	(Дева, ближе к Весам, как и показано двумя фигурами, одна под Девой, а другая сзади Девы, впереди Весов).
Юпитер	135°0	(Рак, ближе ко Льву, вполне удовлетворительно: одна фигура под Раком, а другая над Раком, ближе ко Льву).
Марс	302°3	(Козерог, как показано двумя фигурами над головой и на спине Рака).
Венера	36°1	(Овен, около средины, как и показано парочкой женских путниц под Овном).
Меркурий	5°0	(Рыбы, около средины Рыб, но благодаря тому, что средина уже замещена Солнцем, Луной и знаком равноденствия, Меркурий поставлен по неволе впереди, ближе к Водолею, как и было).
Солнце	16°44	(Рыбы, около средины, как и показано кружком над Рыбой, с глазом посредине его).
Луна		Рыбы, как и показано.

Figure 3.1: *The original table with Morozov's decoding for the Long zodiac and Edelson's computations of the planetary positions on March 15, 568 A.D.* (Taken from [4], Vol. 6, p. 669)

we can verify that the Morozov computations were indeed correct (see Figures 2.1-2.2.).

We will return to these results later when we will analyze the possible decoding variants of the Denderah zodiacs.

Morozov's result is consider to be the first satisfactory from the astronomical point of view solution for the dating of the Denderah zodiacs. Let us emphasize that his computations were done only for one decoding, and there was no other solution found in the time interval from 964 B.C. to 1303 A.D. For obvious reasons N.A. Morozov was forced to restrict his calculations to the time interval that seemed to



Совр. долготы.

Сатурн . . . . . 212°0 (Дева у Весов)
Юпитер . . . . . 23°1 (Рыбы у Овна)
Марс . . . . . 18°8 (Рыбы)
Венера . . . . . 33°7 (Овен)
Меркурий . . . . . 90°6 (Между Тельцом и Близнецами)
Солнце . . . . . 76°3 (Телец у Близнецов)
Луна . . . . . в Весах.

Figure 3.2: *The original table with Morozov's decoding for the Round zodiac and Edelson's computations of the planetary positions on May 6, 540 AD.* (Taken from [4], Vol. 6, p.687)

him reasonable. However, Morozov's solution wasn't perfect. There were few significant discrepancies between his solution and the data contained in the Denderah zodiacs:

- The figure representing Venus on the Long zodiac, according to Morozov's decoding, was placed between Aries and Taurus. But in his solution Venus appears to be between Aries and Pisces, so it is on the opposite side from Aries. Still, one can explain such discrepancy by assuming that planetary positions on the Long zodiac were illustrated with certain aristic freedom. Of course, when dealing with an ancient Egyptian zodiac it is evident that there must be some limit for its accuracy so we can expect in advance some imperfections, which only bacome clear after obtaining some acceptable solutions. Nevertheless, based on our results, we are convinced that the accuracy of the Egyptian zodiacs is much higher than it was assumed by Morozov.
- According to Morozov's decoding of the Long Denderah zodiac, Mercury was located on the West from the Sun between Aries and Taurus. However, in his solution Mercury is on the East from the Sun, between Taurus and Gemini. Consequently, the order of the planets on the zodiac and in the solution are not the same.
- On the Long zodiac, there is no star sign placed over the head of the figure representing Mercury, what Morozov himself interpreted[6] as an indication that Mercury was not visible due to its proximity to the Sun. However, Mercury in his solution was definitely visible. This matter was discussed by two Russian physicists N.S. Kellin and D.V. Denisenko:

" It is difficult to explain why Mercury that on May 6, 540 AD. was $15^o - 17^o$ *to the East from the Sun, is located on the Long zodiac to the West from the Sun, so close that it couldn't be visible because of the sunlight, which was confirmed by the absence of a star sign over its head. But,* 15^o *from the Sun makes Mercury visible even at the latitude of Moscow, not to mention that it would be even more visible in Egypt, where the ecliptic is less inclined to the horizon"*[7].

- On the Round zodiac, Mercury has star sign over his head that indicates its visibility. But in Morozov's solution Mercury was invisible. Let us explain that for visibility of a planet or star (except Venus) the submersion of the Sun with respect to the horizon must be at least $9^o - 10^o$. In Morozov's solution, the submersion of the Sun on March 15, 568 A.D. in Egypt, at the moment Mercury was rising above the horizon, was only $4^o - 6^o$ (further we go to the North of Egypt — smaller the submersion becomes). Brightness of Mercury at that time was +0.4, according to the *standard brightness scale*, what can be compared with the brightness of some stronger stars. All the above indicates that on March 15, 568 A.D. Mercury was definitely invisible[8].

All the above imperfections of Morozov's solution convinced N.S. Kellin and D.V. Denisenko to write the following comment:

"The solution obtained by N.A. Morozov for the Long zodiac contains several flaws and therefore should be called conditional[9]

In 1990s, Kellin and Denisenko extended Morozov's computations for the Denderah zodiacs beyond the year 1303. They adopted the proposed by Morozov decoding, fully trusting him in this respect. This time the astronomical calculations were done using computers and all the dates, until present times, were verified for their conformity with the data provided by the zodiacs. They found that there is one more solution for the Denderah zodiacs:

The Long Denderah zodiac: **May 12, 1394 AD.**
The Round Denderah zodiac: **March22, 1422 AD.**
(N.S. Kellin and D.V. Denisenko[10])

The solution obtained by N.S. Kellin and D.V. Denisenko appears to be better than Morozov's solution[11]. However, for the Long zodiac this new solution still wasn't flawless and the authors were aware of it. They made the following comment:

" We have to admit that our solution for the Long zodiac should also be considered as conditional even if it is more satisfactory than the one that was found by Morozov[12]*."*

Consequently, it is clear that there is no ideal solution for Morozov's original decoding of the Denderah zodiacs. In the year 1999-2000, the problem of astronomical dating of Egyptian zodiacs, including the Denderah zodiacs, was studied by Tatiana Fomenko, who analyzed the decoding proposed by Morozov and suggested some modifications. In particular, she discovered that the drawing of the Long zodiac, taken from the book *Uranographia* by Bode, which was used by N.A. Morozov, contained several mistakes[13]. This drawing was orig-

[6] See [4], Vol. 6, pp. 675, 678-679.
[7] See [15], p. 315
[8] The calculations were done using the program *Turbo Sky*
[9] See [15], p. 323
[11] See [15], pp. 321-325.
[12] See [15], p. 325.
[13] See [1], p. 746-748.

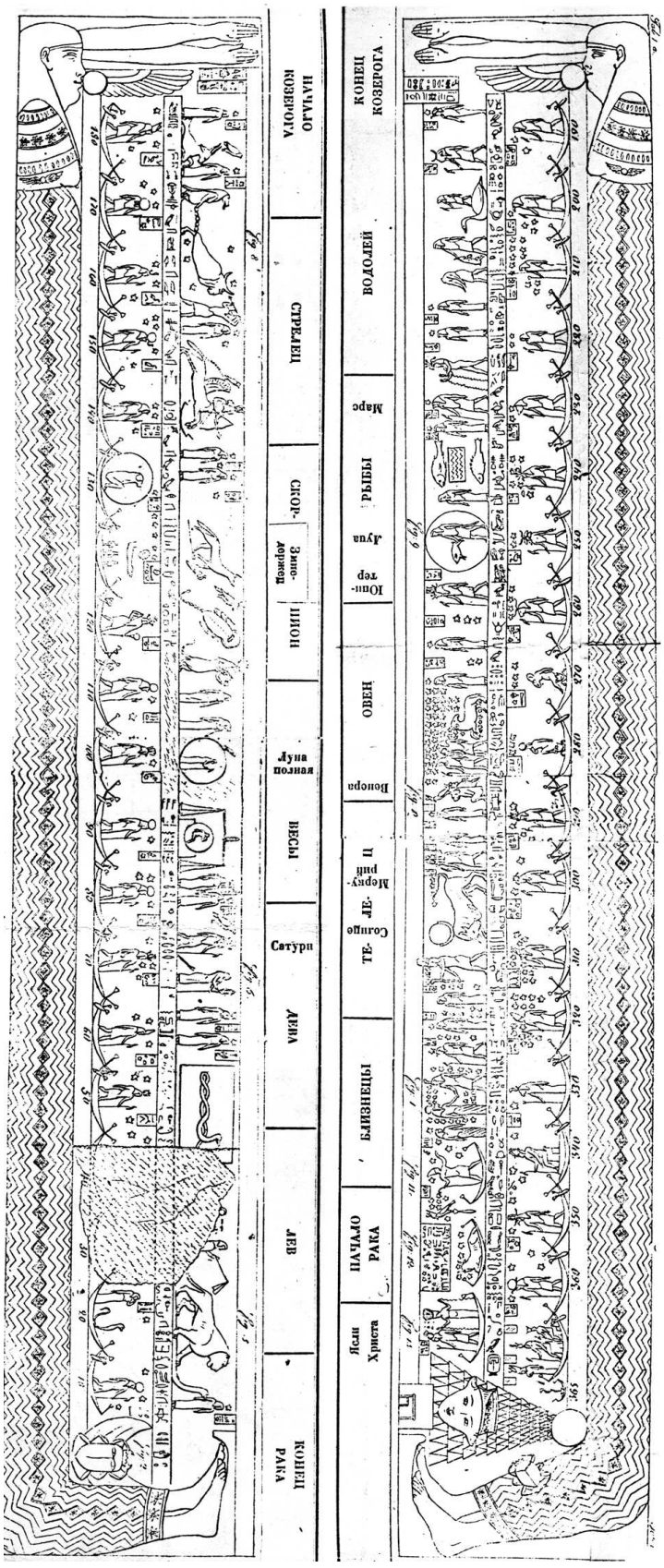


Figure 3.3: *The drawing of the Long zodiac used by N.A. Morozov, which was reproduced from the Bode's "Uranographia".* (See [4], Vol. 6, p. 671-672. The annotations on the drawing were made by Morozov)

inally published in the second volume of the D.V. Denon's book [109]. In 1798, he accompanied Napoleon Bonaparte on his expedition to Egypt, and there he made numerous sketches of the ancient monuments. By comparing this drawing with the picture of the Long zodiac published in the Napoleonic album, T. Fomenko noticed that the existing differences were sufficiently significant to change the astronomical meaning of the Long zodiac. Clearly, Morozov was not aware of these mistakes which resulted in an erroneous decoding of the horoscope. We show on Figure 3.3 the drawing of the Long zodiac from Bode's "Uranographia". T. Fomenko wrote:

"N.A. Morozov with full trust in the Denon's picture decoded the Long zodiac. ... Let us look carefully at the Denon's picture. It is easy to notice that the figure representing Saturn somehow doesn't have a walking stick, which is present on the original. ... On the contrary, Denon supplied a figure standing between Libra and Virgo, with a walking stick. ... On the Napoleonic drawing this figure has no stick. Morozov, deceived by Denon's picture, recognized this figure as Saturn, ant that was a mistake[14].

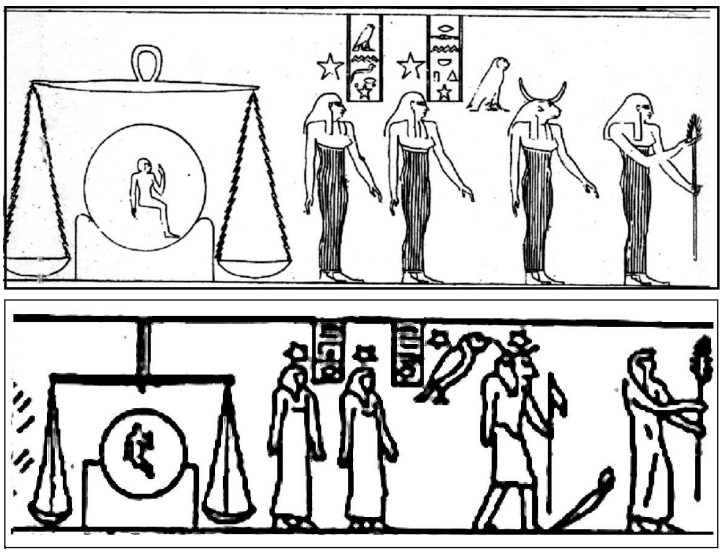


Figure 3.4: *Comparison of the Napoleonic picture of the Long zodiac and Denon's drawing: the fragment between Libra and Virgo*

On Figure 3.4, we compare the discussed by T. Fomenko fragment of Denon's drawing of the Long zodiac with the same fragment of the Napoleonic picture. Notice that

on Bode's drawing the female figure, which on the Napoleonic picture has a crescent over her head (second from the right), was changed into a male figure and in addition it was equipped with a walking stick. This transformation resulted in "creation" of a planetary figure that shouldn't be there.

[14] See [1], p.737.

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As the picture of the Long zodiac, published in [4], Volume 6, was not of a high quality, in Figure 3.5 we show another reproduction of Denon's picture of the Long zodiac, which was taken from [110][15]. T. Fomenko corrected these mistakes in Morozov's decoding and modified it accordingly. For a detailed explanation related to her decoding we refer to [1].

In her work, T. Fomenko stated more strict and rigorous requirements for acceptable astronomical solutions of the Egyptian zodiacs, which are:

- The positions of all the planets on a solution should correspond exactly to their positions on the zodiac without any distinguishable adjustment.
- For an acceptable solution, the order of planets on the ecliptic must be exactly the same as on the zodiac. This requirement, which was introduced for the first time in T Fomenko's work, was not respected by previous researchers.

In many aspects, the above requirements impose new and higher standards on acceptable astronomical solutions for the Egyptian zodiacs. Contrary to Morozov, Kellin and Denisenko, T.N. Fomenko did not accept any conditional solution and kept searching for the exact solutions. Based on these principles, T.N. Fomenko proposed a new decoding of the Denderah zodiacs, for which she found one solution for the Long Denderah zodiac and two solutions for the Round Denderah zodiacs. However, these solutions were previously obtained by N.A. Morozov, and by N.S. Kellin and D.V. Denisenko.

The Long Denderah zodiac: **April 7-8, 1727 AD.**
The Round Denderah zodiac: **March 15, 568 AD.**
or: **March 22, 1422 AD.**
(T.N. Fomenko[16])

We will follow this approach even in more rigorous way and we will show that it is possible to obtain the exact solutions for the all analyzed in our book Egyptian zodiacs. For example, we will also take into account the symbols indicating the visibility or invisibility of the planets portrayed on Egyptian zodiacs, which were not scrutinized by T. Fomenko in [1].

More precisely, our strategy for the astronomical dating of the ancient Egyptian zodiacs will be based on the following principles:

- We will consider only those astronomical solutions which meet all the listed above requirements stated by T.N. Fomenko in [1].
- We will also require that all the admissible solutions satisfy the conditions of the visibility/invisibility indicated on the zodiac by the symbolic convention that was discovered by N.A. Morozov[17].

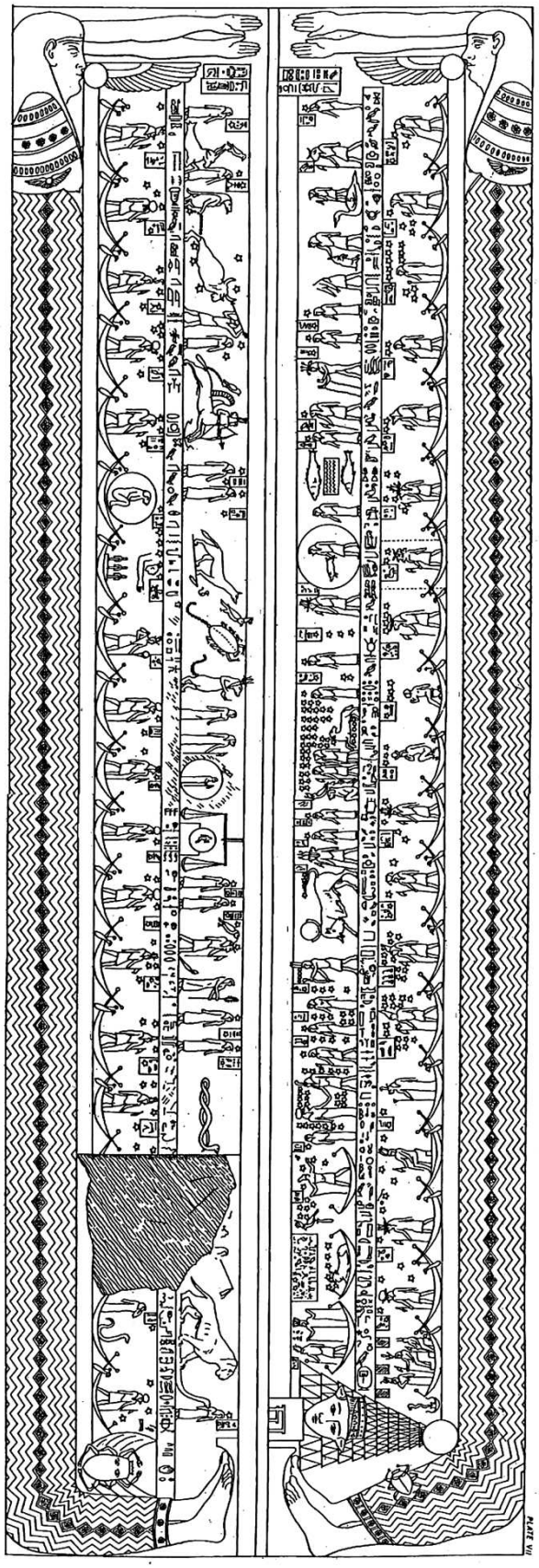

Figure 3.5: *The D.V. Denon's drawing of the Long zodiac.*

[15] See [110], p. 251-252, Plate VII
[17] See [4], Vol. 6, p.675,678 and 679.

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- In addition we will require that any admissible astronomical solution should fully agree with all the additional astronomical information contained in the zodiac.

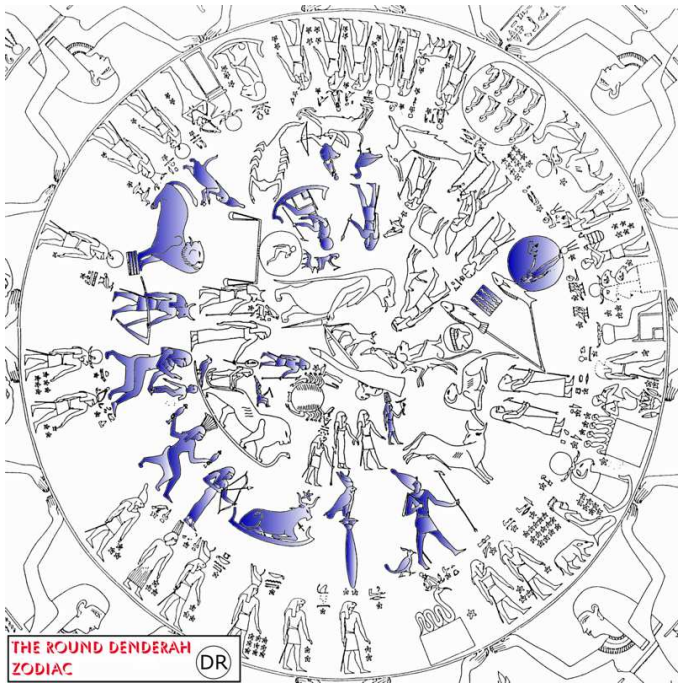

Figure 3.6: *Additional astronomical symbols on the Round Denderah zodiac (marked in blue)*

In addition, contrary to the previous researchers, in our approach we will treat equally all the possible decodings of the Egyptian zodiacs, without choosing in advance any "preferred candidate" for the "best decoding" of the horoscope contained in the zodiac. Let us point out that by applying this method we were able to obtain exact and unique solutions for all the studied in this book Egyptian zodiacs. This fact can be considered as a practical justification and proof of the effectivness our method for the dating of ancient Egyptian zodiacs.

Our investigation of the Denderah zodiacs showed that, beside the main horoscopes, they also contain sufficiently detailed partial horoscopes which we will explain later in this book (see sections 5.5, 5.6, and 5.8). With such a large amount of the additional astronomical information expected from any acceptable solution, the probability of finding by chance a date satisfying all the imposed requirements is practically zero. In order to give an idea how much of a meaningful astronomical information is contained in the Denderah zodiacs, we indicate on Figures 3.6 and 3.7 all the symbols with astronomical meaning which do not belong to the main horoscopes. Clearly, there is a large variety of such symbols.

All the details of our analysis, decoding and dating of the Denderah zodiacs will be presented in the subsequent chapters 7 and 8. Let us simply mention that we have obtained the following solution for the Denderah zodiacs, which appears

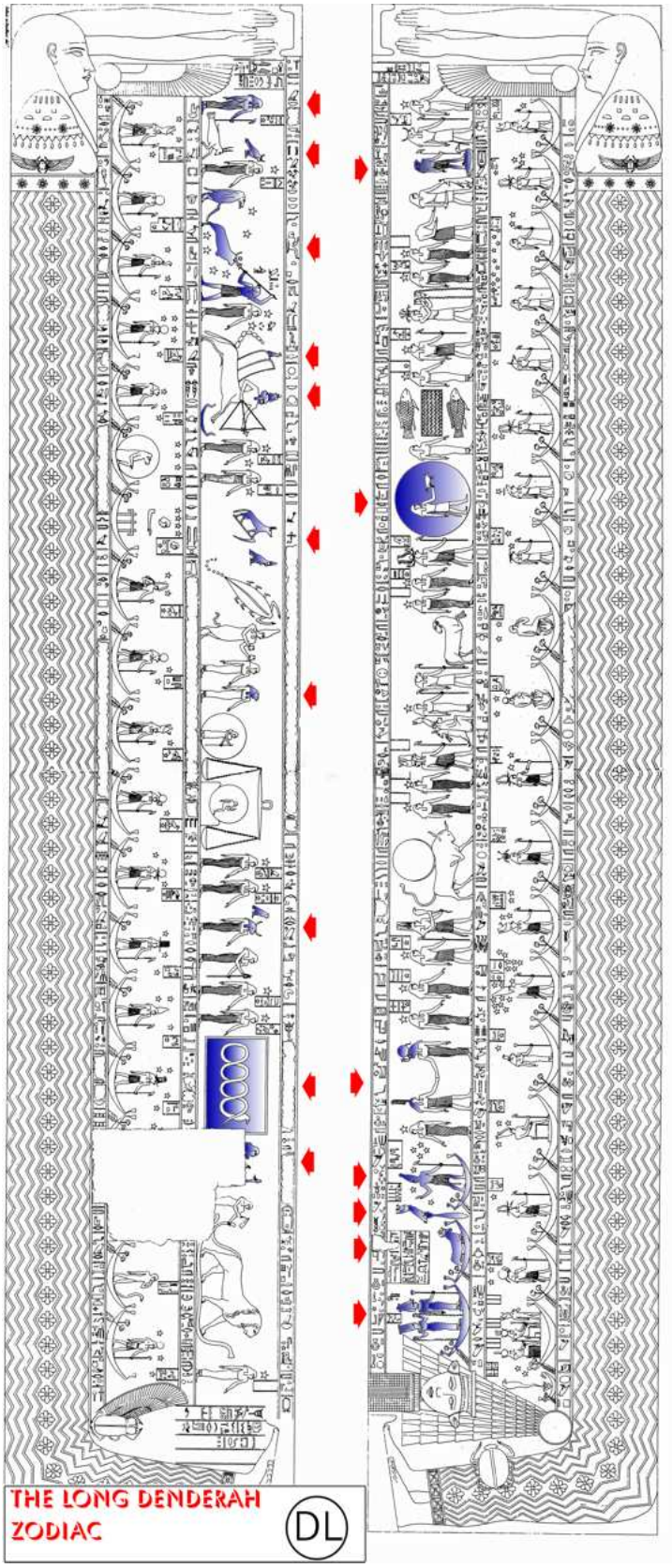

Figure 3.7: *Additional astronomical symbols on the Long Denderah zodiac (marked in blue).*

to be unique on the whole historical interval from 500 B.C. to our times:

The Long Denderah zodiac:

April 22-26, 1168 AD.

The Round Denderah zodiac:

March 13 – April 9, 1185 AD.

3.2 Two Esna Zodiacs

Esna lies 53 kilometers south of Luxor on the west bank of the Nile river, exactly at the place where Nile begins a big semicircle meander around a stony hills area. This was the burial place for Pharaohs and there is also located the famous Valley of the Kings. It is surrounded by many ancient Egyptian temples, structures and monuments. Denderah is located on the north side of this semicircular area, which is not so far from Esna. Let us point out that most of the ancient Egyptian zodiacs come from this region what may indicate their close relationship with the Egyptian tombs (see the map of the river Nile in Egypt on Figure 3.8).

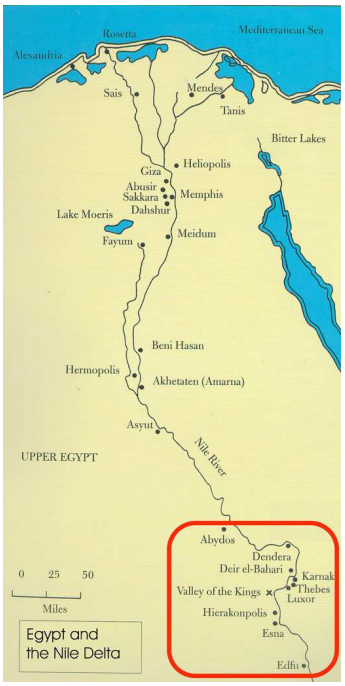

Figure 3.8: *A modern map of Egypt with the Middle Nile Valley indicated*

As we've already mentioned, there were discovered in Esna two temples with zodiacs reliefs on their ceilings. Symbols on these zodiacs are in many aspects very similar to the symbols on the Denderah zodiacs, but there are some clear differences as well.

As far as we know, the first and the only attempt to decode and date the Esna zodiacs, using the astronomical methods, was undertaken by T.N. Fomenko in [1]. She proposed a decoding variant for these zodiacs and calculated the dates based on it. Fomenko's decoding led to the following solution, which appears to be the only one in the whole historical time interval:

The Big Esna zodiac: **May 1–2, 1641 AD.**
The Small Esna zodiac: **May 2-3, 1570 AD.**
(T.N. Fomenko[18])

Our analysis of the Esna zodiacs showed that, in fact, there are several admissible variants of decodings that should be considered for the Esna zodiacs. The additional astronomical information contained in these zodiacs allows to eliminate all the incorrect solutions, which are incompatible with this data. The details of our research related to the analysis of the Esna zodiacs will be presented in sections 7.5 and 7.6. In this moment, let us simply announce our final result:

The Big Esna zodiac:

March 31 – April 3, 1394 AD.

The Small Esna zodiac:

May 6–8, 1404 AD.

This solution appears to be unique on the time interval from 500 B.C. until the present times. We should mention that our final decoding, which led to the above solution, is different from the one suggested by T.N. Fomenko in [1], so the resulting final dates are also different.

3.3 Athribis Zodiacs Discovered by Flinders Petrie

The two Athribis zodiacs which we've already mentioned in section 2.1 (see Figures 2.19 and 3.9), were investigated by N.A. Morozov[19]. He described these zodiacs and the previous attempts of their dating as follows:

"In 1902 the British Egyptology School in London published the work of Egyptologist W.M. Flinders Petrie under the title "Athribis." This book was devoted to the description of findings made by Petrie in 1901 in Upper Egypt near Sohag. Athribis was called in the antiquity Hat-Repit (i.e. Repit Citadel) and is located to the south from Dekr-Amba-Shenude (i.e. White Monastery), where remains of a monastery cell were discovered. This cell was dated by Egyptologists to be of the forth century A.D. To the south from that place, near Horgaze, where the surrounding rocks like a stairway descend to the Nile valley, there were excavated historical remains, which were associated by the researchers with the Old Kingdom. Earlier, in Athribis there were discov-

[19] See [4], Vol. 6, pp.728-752

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ered two temples, one was estimated to be built in the time of reign of Ptolemy IX ... and construction of another was "initiated by Ptolemy XIII Auletes ... and finished by Claudius and Hadrian." Athribis is located on the perimeter of the desert and it was covered by the sand ... The second temple was similar to the Denderah temple or the temple in Edfu. The surrounding the temple columns exhibit Greek influence and sculpture decorations of the both temples point to the "Roman culture." ... Not far from the excavation site of these two temples ... Flinders Petrie discovered a man-made burial cave with walls covered by paintings and inscriptions. On the ceiling there were painted in color two horoscopes joined into one composition. Evidently, they were painted by the same artist, which means that the lower horoscope was painted not more than thirty years later after the upper one, but most probably, even this estimate is too large[20] *".*

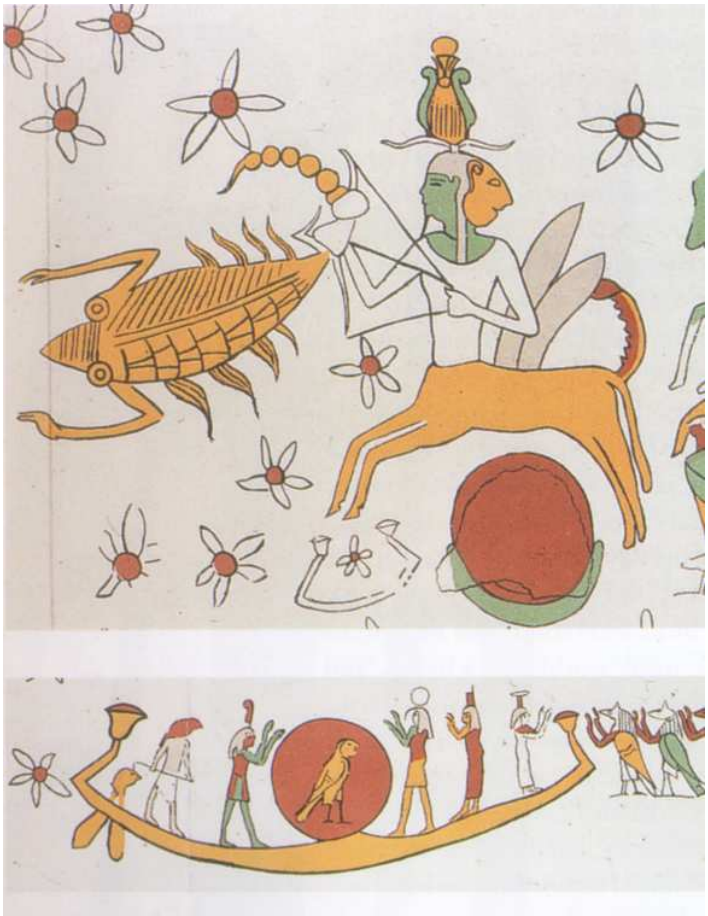

Figure 3.9: *Two fragments of the Athribis zodiacs.* (Taken from [112], p. 22)

N.A. Morozov's assumption that the difference between the dates of the two Athribis zodiacs should not exceed thirty years, appears to be a mistake which led Morozov to the wrong result. Further, Morozov writes:

"*The figures on the zodiacs are of Hellenistic type but they also show some purely Egyptian features. For example, the Orion constellation (look at the lower part of the Figure) symbolized by a man with his right arm rised in a gesture inviting souls of Meri-Hor and his father Ab-Ne-Mani, whose names were written in hieroglyphs near the symbols of their souls, to come to Heaven. Their souls were accompanied by their sins symbolized by snakes and jackals on the left side of the painting. Both souls are shown as birds with human heads. The upper horoscope probably belongs to the father and the lower of his son. Probably, both horoscopes indicate the time of their passage to Heaven, not their births. Only in such a case, it was appropriate to show them as birds*[21] *".*

We intentionally included this long passage from Morozov's book, describing his interpretation of the additional symbols on the Athribis zodiacs, to indicate his erroneous approach based on common understanding of the Egyptian zodiacs as mystic or religious pictures. Morozov declared in haste that those symbols seemed to him unrelated to the main horoscope and having no astronomical meaning. For example, on the Athribis zodiacs he misunderstood an important astronomical information, namely the symbols of the partial horoscopes of the summer solstice (see Figure 3.10), which he categorized as Orion surounded by a mystical entourage.

Figure 3.10: *A fragment of the lower Athribis zodiac the symbols of the partial horoscope of the summer solstice.* (Taken from [111], Plate 10)

Morozov mistakenly took the figures of the partial horoscopes for the souls of a "father" and his "son," what resulted in a huge impact on the final result. By the way, Morozov himself stressed out that on the Athribis zodiac the planets are represented by birds, but strangely he didn't realize the astronomical meaning of this configuration of figures. Consequently, he lost the essential astronomical data directly related to the problem of dating these two horoscopes. Moreover, this mistake reassured him that the difference between the dates for the both Athribis zodiacs, which he believed belonged to a father and his son, should be not more than thirty years. In fact it was wrong to make such a presupposition. We will show that the difference between the dates for these two

[20] See [4], Vol. 6, p. 731.

[21] See [4], Vol. 6, p. 731.

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zodiacs is 98 years, so they could be related to the birth and death of the same person or to the deaths of two relatives.

Let as look on what Morozov writes further:

Similarly to the case of the Denderah zodiacs, the dating of this tomb is particularly reliable due to the fact that we are dealing here with two related horoscopes for which their dates are not too distant one from another. In the summer 1919, Professor B.A. Turaev showed me the forth volume of the "British School of Archaeology in Egypt" containing these two horoscopes for the purpose of more accurate determination of their dates by astronomical methods. In the beginning I'd just repeated the calculations of E.B. Knobel, which were presented in the book. Knobel together with Egyptologists identified the bird with a snake-like tail as Jupiter throwing snake-like thunders, the bird with a bull-head as Saturn, the falcon away from the Sun as Mars, the two-faced Janus and the bird without any specific feature located near the Sun, as Mercury and Venus. My verification showed that Jupiter, in the both horoscopes, appears much too far to the left than it was calculated by Knobel. The same was with Mars. On the other hand, Saturn's position on the lower horoscope was too much to the right than it is shown on the Athribis zodiac. The results appear to be worst than it is claimed by Knobel in this book[22]*.".*

The Dating of the Horoscopes

Be E. B. Knobel.

Second Horoscope,

	Geocentric Longitude.	Epoch, A. D. 52.
Sun in Taurus	31° — 60°	May
Moon in Gemini	61° — 90°	May 20 (New Moon, May 17)
Mercury in forepart of Taurus.	31° — 45°	?
Venus in hindpart of Taurus.	45° — 60°	25° Longitude greater than Sun
Mars in Cancer	91° — 120°	92°
Jupiter between Capricornus and Aquarius	300°	306°
Saturn in Pisces	331° — 360°	358°

The year A. D. 52, May 20, suits well for Moon, Venus, Mars, Jupiter and Saturne:

First Horoscope,

	Geocentric Longitude.	Epoch. A. D. 59.
Sun between Capricornus and Aquarius	300°	January 20
Moon in Sagittarius	241° — 270°	About Last Quarter, January 25
Mercury in forepart of Capricornus	271° — 285°	?
Venus in Pisces	331° — 360°	250°
Mars in Aquarius	301° — 330°	327°
Jupiter in Leo	121° — 150°	148°
Saturn in Gemini	61° — 90°	58°

Figure 3.11: *Dating of the Athribis zodiac by E.B. Knobel.*

We should say that it seems that Knobel himself wasn't satisfied with his result for the astronomical dating of the Athribis zodiacs, which was 52 and 58 A.D. On Figure 3.11 we present the original table with the Knobel's computations which was reproduced by N.A. Morozov in his book [4], Vol. 6. One can easily see that Knobel didn't even try to conduct an independent astronomical dating of the zodiacs and simply attempted to find the most satisfactory dates in the postulated by Egyptologists time interval. Of course, it is always possible to choose the best date for a horoscope in a given time interval, but could it be acceptable as an astronomical solution? Knobel's solution turned out to be very bad and with such a low accuracy it could be possible to date these horoscopes practically to any arbitrary epoch. Knobel was aware of this problem and provides the following explanation:

"The horoscope positions are probably taken from tables and not from observations, and the positions are in signs and not in constellations. The year A.D. 59, January, suits well for Moon, Mars, Jupiter and Saturn, but is discordant for Venus. No attempt has been made to reconcile Mercury. Jupiter and Saturn would be in similar relative positions about every 58 or 59 years. In the epochs –118, –60, –1, 59, 117, the only year that suits the three superior planets is A.D. 59, but the position of Venus is quite wrong for that year[23]*"*

Let us quote what Morozov writes about this issue:

"In order ... to look for a better solution, I've instructed my former assistant from the Astronomical Department of the Lesgaft Institute for Natural Sciences[24]*, late M.A. Vil'ev, to conduct a special investigation of this ancient artifact. He carried complete computations over the interval from 500 B.C. to 600 A.D. ... It turned out that Vil'ev had not obtained any satisfactory result*[25]*."*

As Morozov was unable to obtain a satisfactory solution, he was forced to revise and modify his decoding of the horoscopes from the Athribis zodiacs. Namely, he interchanged Jupiter and Saturn. With this new decoding he was able to find the following solution:

The Upper Athribis zodiac: **May 6, 1049 AD.**
The Lower Athribis zodiac: **February 9, 1065 AD.**
(N.A. Morozov[26])

We show in Figure 3.12 Morozov's computations for the Athribis zodiacs.

However, as it is clear from Figure 3.11, the Morozov solution wasn't perfect. For example, he was forced to assume that only the lower zodiac was based on direct observations, while the upper one was calculated with high inaccuracy. This was his explanation for the fact that Mars on the date specified by his solution for the upper zodiac was not located in the right place on the zodiac (see Figure 3.12). Moreover, the order of the planets in Morozov's solution is different from the

[22] See [4], Vol. 6, p. 731

[23] See [113] or [4], Vol. 6, p. 732.

[24] N.A. Morozov was a director of this Institute.

[25] See [4], Vol. 6, pp. 731-733

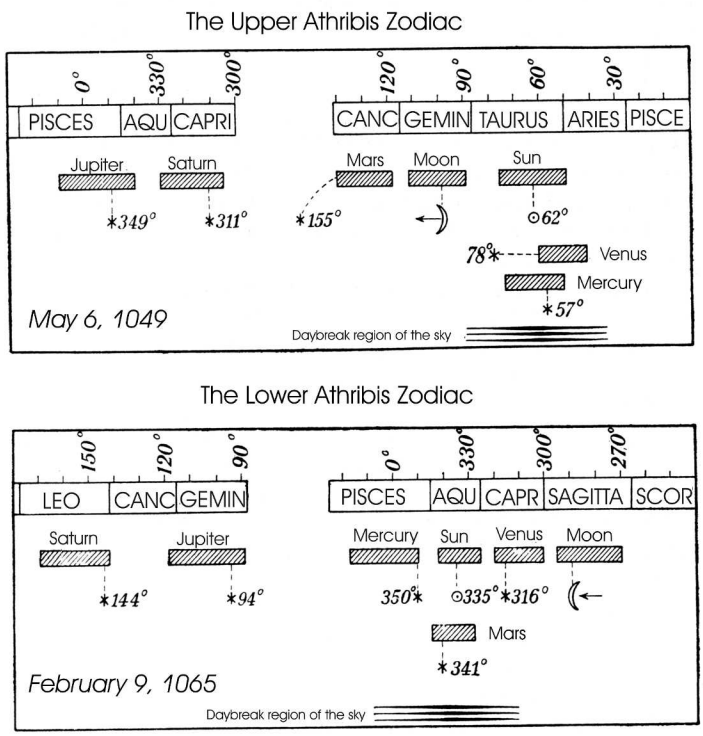

Figure 3.12: *Dating of the Athribis zodiac by N.A. Morozov.* (Translated from [4], Vol.6, p.746, Fig. 150.)

order on the zodiacs. For instance, the order of the planets in the surroundings of the Sun on the lower zodiac, according to Morozov's decoding, is as follows: Mercury, Venus, Sun and Mars (see Figure 2.19). However, in the Morozov solution the order is: Mercury, Mars, Sun and Venus (see Figure 3.12), so it is inappropriate to consider Morozov's solution for the lower zodiac as satisfactory. In fact this solution has several flaws, the most important of which discuss below. N.A. Morozov commented his modified decoding as follows:

"*First of all, a question arises if the interpretation, by the British Egyptologist School, of the bird with snake-like tail as Jupiter, and the bird with bull-head as Saturn, is correct? Flinders Petrie's book doesn't mention even one word why it is so*[27].."

After that, Morozov proposes to interchange the identifications of Jupiter and Saturn. He explains:

"*Jupiter, as it is well known, was turning himself into a bull, but not Saturn. Saturn was considered as an ominous planet ... so the snake-like tail agrees well with its nature, but not with the blissful nature of Jupiter*[28].."

It is hard to accept the arguments of N.A. Morozov as convincing and conclusive. We shouldn't forget that he proposed this conjecture only after unsuccessful attempts to date the Athribis zodiacs trusting the earlier decoding by Knobel. Concerning his objection to identify Saturn with the bird with a bull-head, as it was suggested by Egyptologists, Morozov did not present a strong case. In fact, on the Denderah zodiacs the symbol of Saturn is often accompanied by a figure of a bull. Therefore, it seems that the problem of the identification of Saturn and Jupiter on the Athribis zodiacs should be kept open, keeping in mind that even with the new decoding Morozov was still unable to find a statisfactory solution.

But, there is a more serious issue. Our analysis of the previous two decodings of the Athribis zodiacs, which were used by Knobel and Morozov, uncovered extremely strong flaws. Namely, the same birds on the upper and lower zodiacs were somehow identified with different planets. On Figure 3.13 we show the complete set of the planetary symbols on the Athribis zodiacs together with their identifications according to Morozov and Egyptologists. On this figure one can notice that the fundamental requirement that the same symbols on the both zodiacs should be associated with the same planets, is not fulfilled neither by Knobel's nor by Morozov's decodings. It's clear that by allowing such inconsistent identifications all kinds of various manipulations are possible, which could result in arbitrary dates without any real connection to these zodiacs.

Let us explain Figure 3.13. In the top row, there are presented the planetary symbols from the Upper Athribis zodiac and in the bottom row, from the Lower zodiac. All the planets are symbolized by figures of birds with exception of Mercury which is shown in the same way as on the Denderah zodiacs, i.e. as a two-faced male figure with a walking stick. The annotations in green indicate Morozov's and in brown Knobel's decodings. We placed the similar symbols, according to their apearance, in the same column. It is easy to see that the planetary symbols on the Upper zodiac match the symbols on the Lower zodiac. Indeed, let us point out that there are two birds with horns on each of the zodiacs, but their horns are clearly of different shape, so it is easy to match them with the corresponding birds on the another zodiac. This is not something unexpected — the planetary symbols on two zodiacs, which are the parts of the same composition, should be the same!

It is possible that Knobel's and Morozov's decodings were incorrect because of a very simple reason — erroneous assumption that the difference between the dates encoded in the Athribis zodiacs should be not larger than 30 years. In our analysis of these zodiacs we've considered all the possible variants of consistent identifications of the planetary symbols with specific planets. Moreover, we've also used the additional astronomical information contained in the zodiacs. A detailed presentation of our method will be presented in Chapter 8 (see section 8.1). However, our final result, indicates that the difference between dates for the Upper and Lower Athribis zodiacs is 38 years. More precisely, under the condition that the difference between the calculated dates is not larger than 150 years, we have obtained for the Athribis zodiacs the following complete solution, which is unique in the historical time interval from 500 B.C. till the present time:

[27] See [4], Vol. 6, p. 738.
[28] See [4], Vol. 6, p. 739

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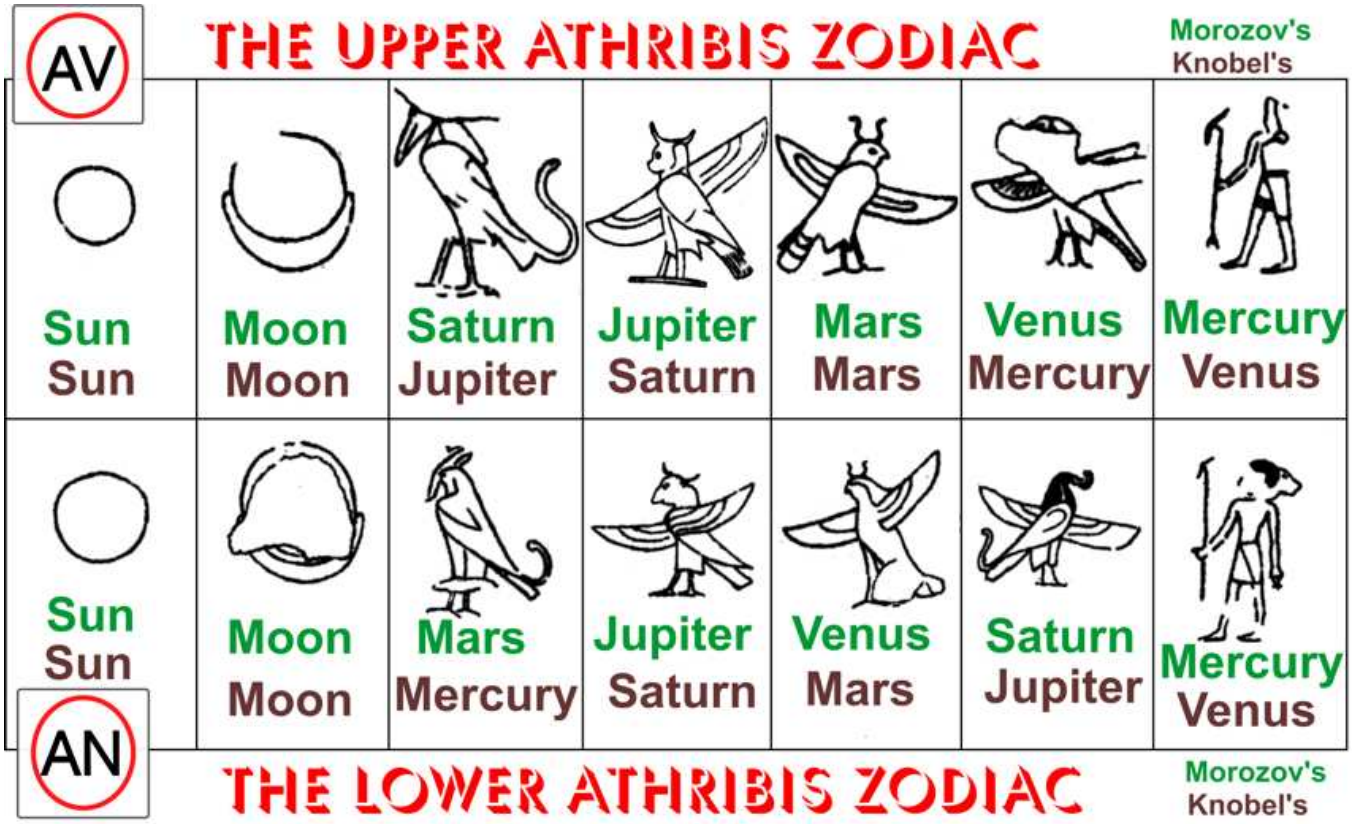

Figure 3.13: *Planetary symbols of the Athribis zodiacs and their identification by Morozov and Knobel*

The Upper Athribis zodiac:

May 15–16, 1230 AD.

The Lower Athribis zodiac:

February 9–10, 1268 AD.

3.4 Brugsch's Zodiac

The Thebes zodiac found by H. Brugsch was discussed in detail in [4], Vol. 6, pp. 695-728. A drawing of the complete zodiac is shown on Figure 2.13 and the part containing a horoscope, which was discovered by H. Brugsch and dated by N.A. Morozov, is presented on Figure 3.14. Regarding this zodiac, Morozov wrote:

"In 1913, N.V. Rumancev, who was still at that time a student at the Philological Institute ... brought to me ... a book by Henri Brugsch: "Recueil de Monuments Egyptiens, dessines sur lieux", in which among other things was described a coffin in a perfect condition, so good that someone could say it was made not long ago. This coffin ... can be found now in the collection of Monier. Brugsch discovered it, according to his own account, in 1857 but published its description only in 1868.

Inside the coffin there was a mummy of the same type as traditional Egyptian mummies ... On the side of its cover, which symbolizes the sky ... there were painted twelve constellations of zodiacs just in the same manner as they are usually shown in astronomical books of the epoch of humanism ... The only important feature here are the Demotic inscriptions written in irregular curved lines on the left side ... among which especially striking are the two lines between Cancer and Leo aiming at the Leo's head. In the first line it is written "Hor-pe-Seta" and in the other "Hor-pe-Ka", i.e. the planets Saturn and Jupiter[29]*. Since these two lines were placed very close one to another, while in the surrounding there was plenty of free space, it indicates that Jupiter and Saturn were near by. ... Near Virgo, from the side of Leo, there is a Demotic inscription "Hor-Tezer" meaning the planet Mars. Between Scorpio and Sagittarius, bending to head of Sagittarius, is written in Demotic "Pe-Neter-Tau," which means "light of the morning" or Venus .... and finally, between Scorpio and Libra, there is written "Sebek", which means Mercury*[30]*."*

Concerning the positions of the Sun and Moon on the zodiac, Morozov wrote:

"The figure of Scorpion ... is painted in a way indicating that it is submerged in the sunlight, what takes place in November, and the figure of Taurus, which is opposite to Scor-

[29] Morozov took all the translations of the inscriptions on this zodiac from the book [14] of H. Brugsch.

[30] See [4], Vol. 6, pp. 697-698.

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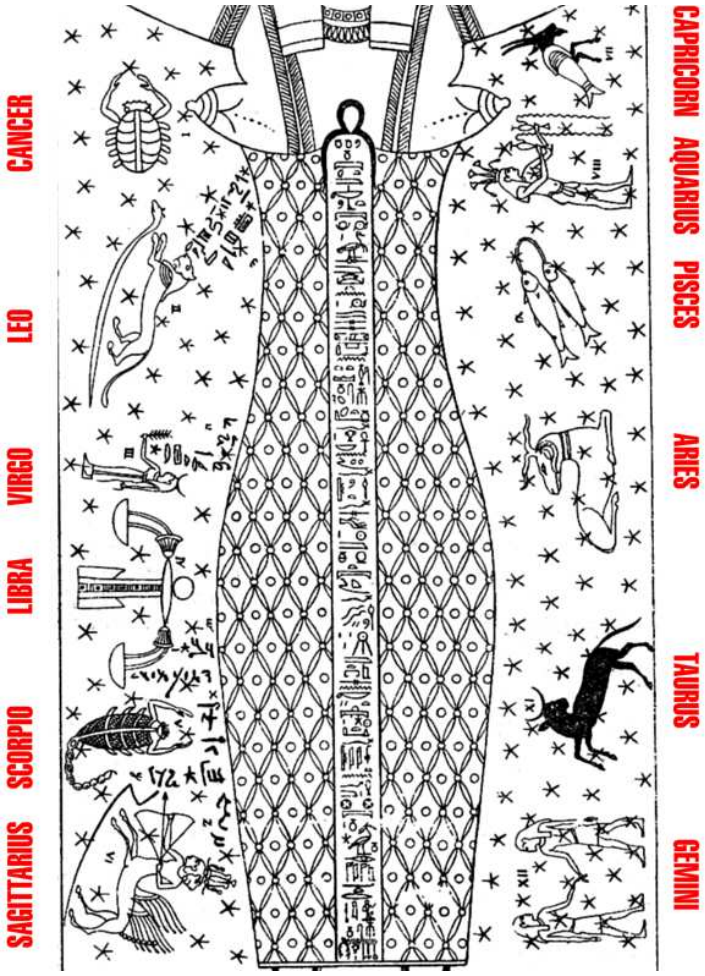

Figure 3.14: *Fragment of Brugsch's zodiac with the constellation symbols and names of planets.* (Taken from [14])

pio, is black, what indicates that it could be seen all the night (i.e. it culminated at the midnight). A crescent is shown on the head of Virgo, which corresponds exactly to the appearance of the Moon when the Sun is in Scorpio[31]*."*

In the above passage it is indicated that the Sun is shown on the zodiac in Scorpio and the Moon in Virgo.

"Demotic script was first deciphered by J.D. Akerblad in 1802, twenty years before Jean-François Champollion decoded the hieroglyphic writing. Demotic is believed to be not as old as hieroglyphs ... Brugsch dated this coffin to the time of the Roman reign in Egypt, i.e. not later than the first century A.D. It is understandable how I was excited to work on the dating of such a remarkable artifact .... but I couldn't believe my eyes when I've obtained a shocking result indicating the unique solution: November 17, 1682 A.D.[32]*"*

Further in his book, N.A. Morozov admits that there was another perfect solution, which was even better than the first one, because the order of Mercury and the Sun, contrary to the first solution, was exactly the same as on the zodiac. However, the location of Jupiter and Saturn was in the tail of Leo, instead of the Leo's head. This solution was November 18, 1861, but Morozov rejected it as impossible because it was later than the date of the zodiac's discovery.

We've verified all Morozov's calculations and confirmed their accuracy. There are indeed only two solutions for this Demotic horoscope and they are exactly as it was described by Morozov. Let us point out that the planetary positions inside a particular constellation were never accurately indicated on the Egyptian zodiacs, even in such cases when the arrangment of a zodiac allowed it in principle (we will illustrate it later in this book). So, there is no foundation to assume that Jupiter and Saturn met exactly at the Leo's head, but we should be satisfied with any close position of these two planets inside the Leo constellation. On the other hand, the order of the planets on Egyptian zodiacs is usually correct. From this point of view the first solution is a little bit worst than the second one. At first, because of the reasons pointed out by Morozov, we'd considered the solution 1861 as impossible. However, later, we have discovered on Brugsch's zodiacs two more complete horoscopes, which contrary to the Demotic horoscope, were the integral parts of the original picture. It is quite obvious that the Demotic horoscope wasn't a part of the original design and it was appended to the zodiac much later — this fact was already remarked by the previous investigators, including N.A. Morozov[33].

One of these newly found horoscopes is located on the left side of the picture and the another one on the right. We show these horoscopes on Figure 3.15. We will call the horoscope on the right the *horoscope in Boats* because all its planetary symbols are shown standing in boats. On the other hand, the left-hand side horoscope has all its planetary symbols represented by figures without walking sticks, probably in order to avoid confusion with the horoscope in Boats. We will call it the *horoscope without Walking Sticks*.

The detailed analysis of Brugsch's zodiac will be done in Chapter 8 (see section 8.2). The horoscopes in Boats and without walking sticks have very few solutions in the historical time interval, but there is a pair of reasonable close solutions, which are the years 1841 and 1853. Probably, these two dates indicate the birth and the death of a young person for which this coffin was made. But this would indicate that the date of the Demotic horoscope is also from the nineteenth century (1861), so the second Morozov solution would be right. Maybe our computations can be considered as an evidence that H. Brugsch was fooled by somebody who supplied him as a joke with this not so old coffin and annotated the zodiac using Demotic script to indicate this strange date 1861. At that time it wasn't a problem to create horoscopes for future dates, which could be simply looked up in the astronomy books. The story of Brugsch's zodiac definitely deserves some more investigation.

[31] See [4], Vol. 6, pp. 695-696.
[32] See [4], Vol. 6, pp. 697-698, 727.
[33] See [4], Vol. 6, p.797.

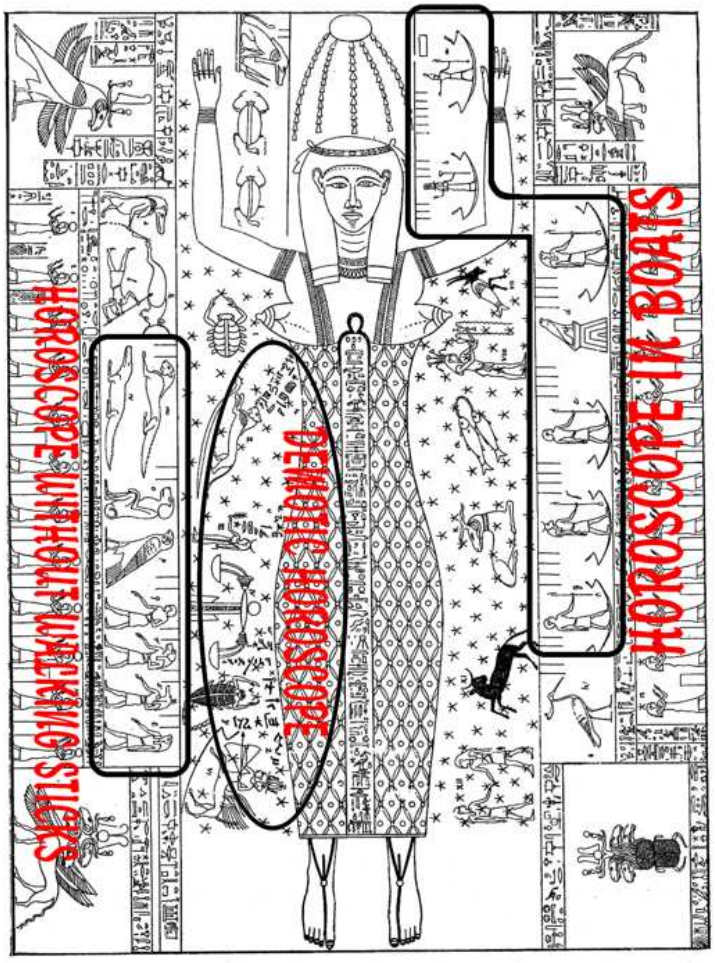

Figure 3.15: *Brugsch's zodiac with the three horoscopes indicated.*

In conclusion, let us summarize all the results obtained for this zodiac. We begin with the Morozov's solution:

The horoscope in Boats:

Not investigated

The horoscope without walking sticks:

Not investigated

The Demotic horoscope:

November 17, 1682 AD.
(Solution November 18, 1861 AD. was rejected)

(N.A. Morozov[34])

Our solution for Brugsch's zodiac[35]:

The horoscope in Boats:

February 15, 1853 AD.

The horoscope without walking sticks:

October 6–7, 1841 AD.

The Demotic horoscope:

November 18, 1861 AD.

3.5 Astronomical Dating of Zodiacs by Egyptologists

Let us discuss briefly the astronomical dating that can be found in the books written by Egyptologists. We are not going to investigate all the details of this approach mainly because their methods of dating are profoundly influenced by Scaliger's chronology of Egypt and therefore can not be considered as objective or independent. As our main goal is to present an unbiased and independent from any pre-assumption approach to the astronomical dating of Egyptian zodiacs, it is not our concern to look for methodological errors in these methods. In this section we only would like to illustrate on one example of the Round Denderah zodiac, how Egyptologists do it.

In 1970s, French Egyptologist Sylvie Cauville published a five volume monograph *"Dendara. Les chapelles osiriennes"*[36] about the reliefs in the Denderah Temple. Cauville completely devoted another book entitled *"Le zodiaque d'Osisris"*[37] to the Round Denderah zodiac. This book was based on her findings published in the monograph. In the chapter entitled *"Dating of the zodiac"* she presents an attempt to astronomical dating of the Round zodiac. Right in the beginning she refers Scaliger's Egyptian chronology and states that Ptolemy Auletes — the King of Egypt in the first century B.C., renovated the Denderah Temple for the last time[38]. Even before starting astronomical analysis, she already concludes that the date of the Round zodiac must be between 51 B.C. and 47 B.C.[39] In this way she reduced the role of the astronomical analysis to a secondary verification of the date that seems to be already well-known to the author:

"Partant de cette donnée assurée, É. Aubourg a cherché si, dans se laps de temps (51–43 av. J.-C.), la place des planètes parmi les constellations du zodiaque était astronomiquement possible[40]*."* Which means: *"Staring from this conclusive data, É. Aubourg was checking if in this period of time (51 B.C. – 43 B.C.) the planetary positions among the constellations on the zodiac were possible from the astronomical point of view."*

[35] See details in Chapter 7?

[36] See [11].
[37] See [10].
[38] See [10], p. 11.
[39] See [10], p. 11.
[40] See [10], p. 11.

Based on the Aubourg's computations, S. Cauville claims that the configuration of the planets on the zodiac was indeed possible in the required period of time. However, a little further she provides an explanation that can hardly support such a statement. In fact, already on the next page[41] it becomes clear that the planetary positions shown on the Round zodiac, according to Cauville's decoding, never appeared on the sky in the specified by her time interval. Her solution is simply based on manipulations with different dates for different planets so the planetary positions could be compared with the zodiac. Moreover, she does it only for two planets: Mars and Mercury. It is absolutely evident that this type of "confirmation" can be applied to any arbitrarily given period of time with the same positive result. More precisely, S. Cauville dates the Mars position on the Round zodiac by June 16, 50 B.C. and Mercury by August 12, 50 B.C.[42]. The difference between these two dates is about two months, what is relatively long time taking into account that Mars is a fast moving planet and Mercury is even faster than Marsy. During the indicated by Cauville time Mercury actually had traveled through two full zodiac constellations. However, Cauville "cleverly" neglects to discuss the positions of all the other planets from the zodiac, which by chance are different for the indicated dates. Let us indicate that the decoding which was used for this dating places Venus and Mercury on the opposite sides of the zodiac, what is astronomically impossible. In addition, the symbols of the Sun and Moon are interpreted, for some unknown reason, as the signs of the solar and lunar eclipses[43]. Assume for a second that these two symbols indeed were correctly recognized as eclipses and consider their implications on the dating of the zodiac. In her book, she suggested two candidates for the date of the lunar eclipse: April 1, 52 B.C. (maximal phase at 21:21 GMT) and September 25, 52 B.C. (maximal phase 22:56 GMT)[44]. But, these two ellipses are not full and in fact similar eclipses are quite common and happen almost every year, so it is not surprising that S. Cauville was able to find not only one, but two such eclipses. Notice, that there is no connection between the dates for Mars and Mercury and for the lunar eclipses. Regarding the solar eclipse, she found the eclipse on March 7, 50 B.C. at 11:10 GMT, which was supposed to be almost full in Denderah. With the help of the astronomical software *Turbo Sky* we found that this eclipse in the Nile region was only partial and didn't cause any significant darkening of the sky. The trace of the maximal phase of this eclipse was 100 km to the West from Nile, and therefore from Denderah as well. Again, there is no connection with the dates of lunar eclipses. The few year proximity of all the suggested dates can not be considered as any kind of a proof for any approximate date. Taking into account the above observations, it is impossible to claim that the dates arount the year 50 B.C., which were found by Cauville, are related to any kind of a particular astronomical event. Is clear that these dates represent absolutely nothing exceptional from the astronomical point of view. In fact, it is possible to find such a sequence of astronomical situations in any arbitrary historical epoch. However, we should point out that there was no justification for the interpretation of any symbol on the Round zodiac as an eclipse sign.

It is not possible to discuss all the mistakes and flaws related to the astronomical analysis of the Round zodiac contained in [10]. For example, the same symbols are sometimes considered as planets and another time as non-zodiacal constellations[45]. Cauville's wrong identification of Venus on the Round zodiac, is a repetition of Brugsch's mistaken identification of this planet, which was discovered and corrected by N.A. Morozov[46].

There can be only one conclusion, that the whole analysis presented in this book confirms again, that in the pre-assumed by Egyptologists time interval there is no solution for the Round zodiac. We refer all the interested readers to the books [10] and [11] for more information on this subject.

[41] See [10], p. 12.
[42] See [10], p. 12.
[43] See [10], pp. 19–22.
[44] See [10], p. 20.
[45] See [10], p. 9.
[46] See [4], Vol. 6, pp. 652–653.

Chapter 4

New Approach to Decoding of Egyptian Zodiacs

4.1 New Approach to Decoding of Egyptian Zodiacs

In this section we will describe in general terms our approach to the decoding and dating of Egyptian zodiacs. Before undertaking the task of dating any particular zodiac, first we analyzed ancient Egyptian zodiacs with the purpose of comparing their symbols. Let us emphasize that this analysis was based not only on one, two or even few similar zodiacs, but we considered the collection of all accessible to us Egyptian zodiacs. It turned out, and it was not at all evident in the beginning, that the astronomical symbolism on all these zodiacs was practically the same. This observation was crucial for a better and deeper understanding of the symbolic language of the Egyptian zodiacs. Recall that all the previous researchers attempted the analysis of particular zodiacs without a systematic comparative analysis of their symbols on other available to them Egyptian zodiacs.

Let us be more specific. Is it possible to decode the symbols on Egyptian zodiacs in such a way that the same symbols would have the same meaning on all the zodiacs? Of course we have to require that the obtained in this way astronomical pictures were meaningful in all cases and their solutions belong to a historical time interval. From the statistical point of view, the last requirement, if it is satisfied, would give us a high confidence that the obtained results are not products of a pure coincidence, but they reflect the real contents of the Egyptian zodiacs. Yes, it is possible and we will provide the reader with substantial proofs supporting this claim! What is the most significant, practically all the obtained dates appear to be unique in the historical interval and indicate a single historical epoch starting in the 12th century A.D. Let us underline that the existence of a uniform symbolic language on the Egyptian zodiacs is not at all evident. In principle, it could be possible that Egyptian artists used astronomical symbols in a somehow chaotic and unsystematic manner. For example, similar symbols on different zodiacs could have completely different astronomical meanings. However, if it was the case, we would not be able to arrive to such methodical and meaningful results, which we have indeed obtained. The wrong general approach could lead in some cases to a decoding of the planetary position which were either astronomically impossible or produced some unreasonable dates.

With the results already in our hands, it is impossible to accept the opinion claimed by Egyptologists, that ancient Egyptian artists created most zodiacs as products of fantasy, where their astronomical content was completely secondary. In what follows we'll show that the astronomical content of the Egyptian zodiacs is surprisingly rich and precise, which couldn't have been a product of pure imagination.

It turns out that behind the usage of astronomical symbols on Egyptian zodiacs, there are definite and systematic rules. For example, the same astronomical symbols or their combinations, in a similar context, always have the same meaning. However, the identical astronomical notions could be represented in different ways, exactly as in the hieroglyphic writing.

4.2 Equinox and Solstice Points on Egyptian Zodiacs

In this section we will discuss briefly the background behind our new unified interpretation of the symbols of Egyptian zodiacs. The precise astronomical meaning of the symbolizm on Egyptian zodiacs was not systematically investigated by previous researchers and consequently, their astronomical dating contains flaws.

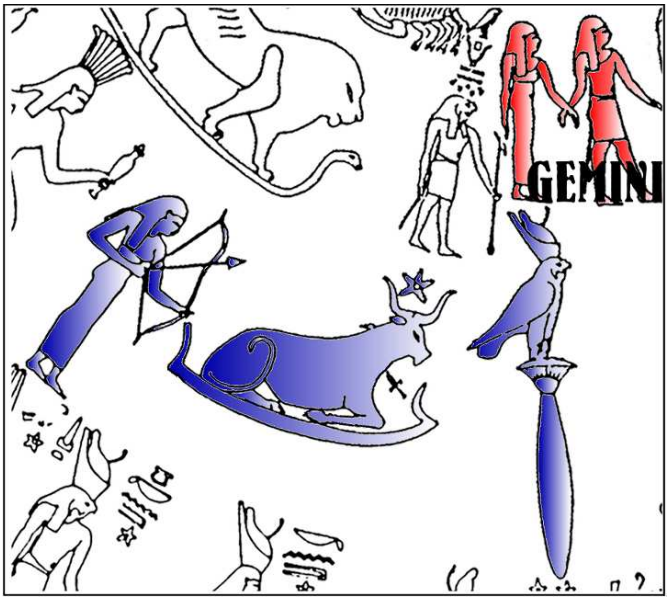

Figure 4.1: *Fragment of the Round Denderah Zodiac. Marked in blue: "Bull laying down on a boat," "Woman shooting an Arrow" and "Pillar"*

Let us notice that on many Egyptian zodiacs one can find the same or similar symbols. Sometimes, these symbols are almost identical or just slightly modified. Moreover, there are repetitions not only of individual symbols but even of larger groups. An attentive observer will notice that many of such groups or single symbols always appear in the same positions on the ecliptic, i.e. near the same specific zodiac constellation. Clearly, these symbols can not be associated with planets, which constantly change their locations on the ecliptic, moving from one zodiac constellation to another. Therefore, it becomes evident that these symbols represent something different from planets but, as their positions are fixed on the ecliptic, it is indisputable that they have some astronomical meaning as well. This observation leads us to an important conclusions which will allow us to decipher more completely the symbolic language of Egyptian zodiacs including the planetary symbols.

Let us give an example. We consider the following group of symbols:

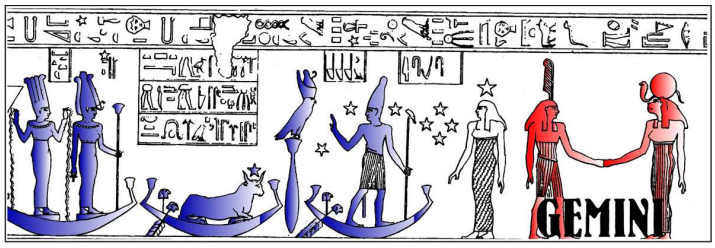

Figure 4.2: *Fragment of the Long Denderah Zodiac. Marked in blue: "Man with Raised Hand", "Bull laying down on a boat" and "Pillar"*

(1) A pillar, sometimes with a bird on the top of it, or in between two poles bending away from each other (see Figures 4.1, 4.2 and 4.3);
(2) A man with a raised hand (see Figures 4.4 and 4.5). If that figure is shown holding in his other hand a walking stick, which is a planetary symbol, than necessarily he is standing on a boat.

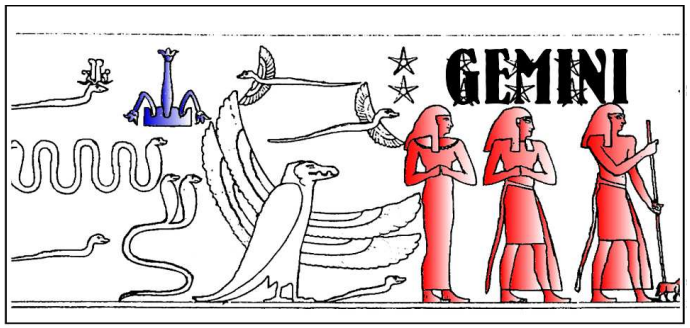

Figure 4.3: *Fragment of the Big Esna Zodiac. Marked in blue: "Pillar" with two bended poles*

(3) A laying bull, sometimes with a women standing behind and shooting an arrow over the bull (see Figure 4.1, 4.2, 4.4 and 4.5). On some zodiacs, the figures of a bull and a woman are shown on the same or separate boats. On the Round zodiac only the bull is laying down on a boat.

Notice on Figure 4.4, that the imaginary line on which the "Man with the Raised Hand" is standing passes exactly through the Gemini sign and we can think about it as an indication that he stands in Gemini.

Notice on Figure 4.5, that the Arrow is "moving" above the head of the Laying Bull and it seems that it comes from the Woman standing behind the Bull. This group shows lots of similarities with the Round zodiac (see Figure 4.1).

We would like to point out that the listed above symbols are located on Egyptian zodiacs only in close proximity to Gemini, and never appear in other parts of these zodiacs. Clearly, there is some reason that connects this group with Gemini or something inside it. A natural question arises what makes Gemini so special among other constellations that this

Figure 4.4: *Fragment of the Athribis Zodiac. Marked in blue: a "Man with a Raised Hand" and a "Bull Laying down" on a boat.*

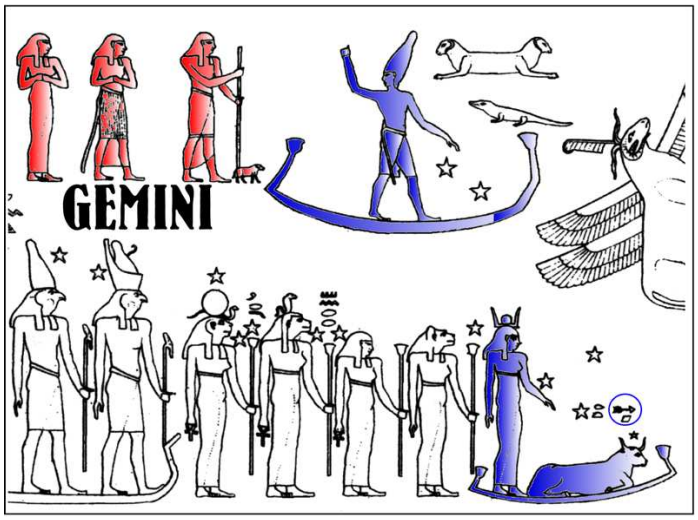

Figure 4.5: *Fragment of the Small Esna Zodiac. Marked in blue: a "Man with Raised Hand", a "Bull Laying" down on a boat, a "Woman" and an "Arrow".*

group of symbols is always surrounding it? Let us try to look for some indication that may be related to the role of these symbols. First of all, the character of these symbols (bird sitting on a top of a pillar, man with a raised hand pointing up, or a pillar pointing up with two bended pillars on its sides) may indicate an idea of something "high," for example the highest point or a kind of a local maximum of something. But this is already a good lead to explain why these symbols always appear near Gemini. The summer solstice, the northernmost point reached by the Sun (i.e. which is the highest point for an observer in the Northern Hemisphere) in its annual apparent journey among the stars, lies in Gemini. The term solstice also is used in reference to either of the two points of the greatest deviation of the ecliptic (the Sun's ap-

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parent annual path) from the celestial equator. In fact the summer solstice point is one of the four important astronomical points on the zodiac belt, namely there are the summer and winter solstices and the spring and autumn equinoxes. These points divide the ecliptic in four almost equal parts. We will show that all these four points on Egyptian zodiacs were emphasized by special symbolism.

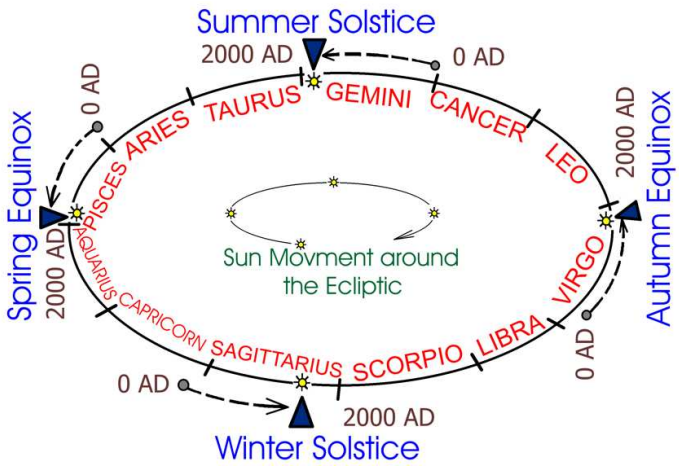

Figure 4.6: *Movement of the solstice and equinox points during the last 2000 years.*

Nowadays, the summer solstice takes place on June 21–22, according to the modern (Gregorian) calendar. On this day the Sun is located in Gemini very close to the border with Taurus. However, this was not always the case. It is well known astronomical fact that the point the summer solstice, as well as all three other equinox and solstice points, slowly changes its position with respect to stars. During 72 years it moves about 1^o in the direction opposite to the Sun's movement on the ecliptic, so it makes a revolution of 30^o in about 2000 years. In particular, that means that during the last 2000 years the Sun at the summer solstice was always located in Gemini. In the beginning of our era it was located near to the border with Cancer and presently it moved to the other side of Gemini, near the border with Taurus. We illustrate the solstice and equinox points motion on Figure 4.6.

Let us remark, that during the last 2000 years, according to Julian calendar, the summer solstice was always in June, the autumn equinox was always in September, the winter solstice in December and the spring equinox in March. In Julian calendar the equinox and solstice dates are moving approximately one day per 128 years. But now we use Gregorian calendar, created in the year 1582, in which the equinox and solstice dates were made invariable calendar dates. However, it was done at the price that one average Gregorian year is too short for the Sun to complete a full revolution around ecliptic.

From the astronomical point of view there are two natural choices for the length of a year. The first is the time of the full Earth revolution around the Sun, which is sometimes called the *sidereal year* (365 days 6 hours 9 minutes 10 seconds). Another one is the time period between two consequent spring equinoxes, which is called the *tropical year* (365 days 5 hours 48 minutes 46 seconds). The average length of a year in the Julian calendar is 365 days and 6 hours, which is approximately the average of these two lengths, while in the Gregorian calendar it is almost the same as the length of the tropical year. Consequently, the difference between the sidereal and Gregorian years is twice larger than the difference between the sidereal and Julian years. In order to avoid complications resulting from the change of calendars that took place in 1582, the Julian calendar is still used for astronomical calculations. In fact it has other advantages for astronomy, for example a century in the Julian calendar is composed of 36525 days, while in the Gregorian calendar this number is 36524.2199, which is not an integer.

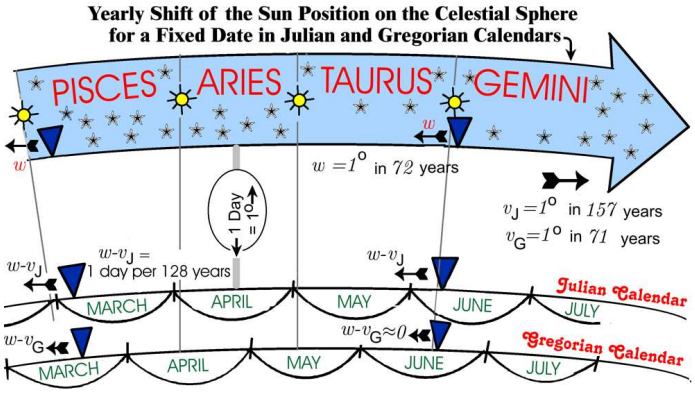

Figure 4.7: *Movement of the Sun positions on the celestial sphere and the equinox and solstice dates in Julian and Gregorian calendars.*

We should remember that as the Gregorian calendar is used only for the dates after 1582, we will need very often to refer to the Julian calendar. On Figure 4.7, we illustrate the astronomical implications resulting from the use of the Julian and Gregorian calendars.

There is another example that we would like to discuss. On the Big Esna zodiac EB one can distinguish two practically the same symbols of "meeting and handshaking" (see Figure 4.8). In order to identify what kind of a "meeting" it is, we look at their position on the ecliptic shown on the zodiac. We notice that one of these symbols is located between Virgo and Leo, while the another one is between Pisces and Aquarius. These are exactly the opposite points on the ecliptic corresponding to the two equinox points: the spring and autumn equinoxes. There is no need for much imagination in order to realize that the meeting taking place at these two points is between the night and the day, which have the same length exactly twice per year on these days. Consequently, we can guess that on Egyptian zodiacs the equinox points were marked by some special symbols. Of course, in order to support this claim we need to analyze other Egyptian zodiacs as well, what is one of our goals in the next chapter.

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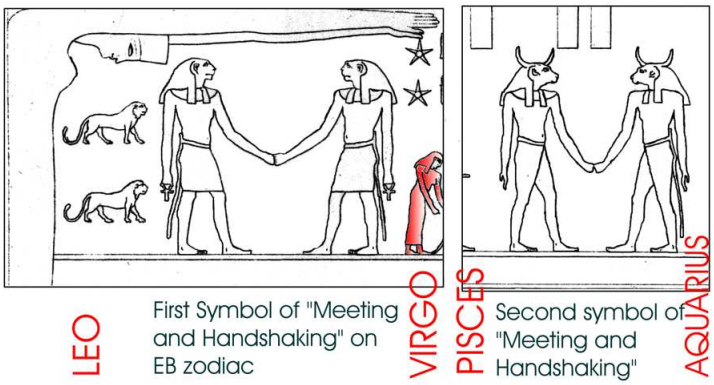

Figure 4.8: *Two symbols of "meeting and handshaking" on the Big Esna Zodiac placed at the equinox points.*

Let us present one more example where the winter solstice is clearly indicated. The winter solstice is the day when the rise of the Sun above the horizon is the lowest in the Northern hemisphere. During the last 2000 years the winter solstice was in Sagittarius (see Figure 4.6). If we look at the sign of Sagittarius on the Big Esna zodiac, we find out that it is the only constellation figure which is placed upside-down, what can be read as an indication of the lowest Sun's position. This is not the case with other Egyptian zodiacs, but there are always some special symbols accompanying Sagittarius on these zodiacs (see Figure 4.9).

We have studied from this point of view all the accessible to us Egyptian zodiacs and concluded that practically on all Egyptian zodiacs the four *tropical points* (i.e. the solstice and equinox points) are always marked by additional symbols located in proximity of the following constellations:

Figure 4.9: *The upside-down Sagittarius indicates the winter solstice on the Big Esna Zodiac.*

- Pisces — since the second century A.D., it contains the spring equinox point;
- Gemini — from the beginning of our era, it contains the summer solstice point;
- Virgo — since first centuries B.C., it contains the autumn equinox point;
- Sagittarius — from beginning of our era, it contains the winter solstice point.

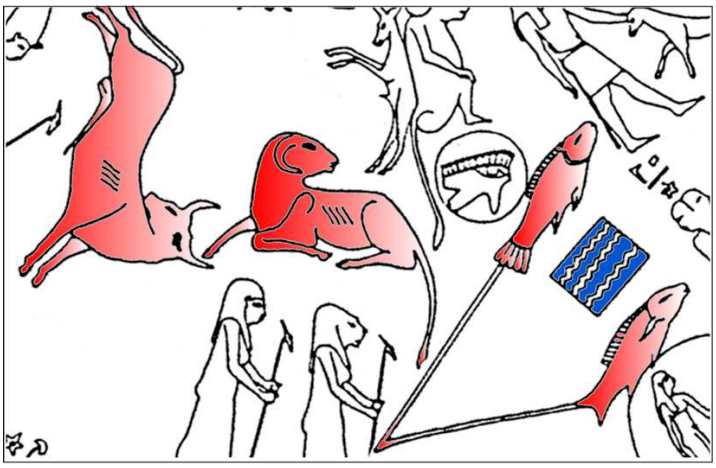

Figure 4.10: *The sign of the spring equinox (marked in blue) on the Round Denderah zodiac.*

We should stress out that, in the beginning of our era, which according to Scaliger's chronology corresponds to the time of creation of the ancient Egyptian zodiacs, the spring equinox was not yet located in Pisces. However, on these zodiacs it is shown in the constellation of Pisces. It entered Pisces only in the second century A.D., which already contradicts Scaliger's chronology version of Egyptian history!

This contradiction was already pointed out by Morozov[1] who recognized on the Denderah zodiacs some of the symbols of the spring and autumn equinoxes (see Figure 4.10). These signs of the equinoxes on the Denderah zodiacs are rectangular palettes with wavy lines inside. One can easily recognize on Figure 4.10 that this sign is located exactly in Pisces and not in Aries, where it should be placed if the zodiac was made in the first century B.C. or A.D.

From the astronomical dating point of view, it is important to notice that often the symbols of these four points were accompanied by some planetary signs. These signs appear to represent the planets which, on the equinox or solstice day, were close to the Sun. Remember, Mercury and Venus are always close to the Sun, but occasionally some other planets could also appear closely to the Sun on these four special days of the year. In this way, the configuration of the planets shown at such a point becomes a meaningful partial

[1] See [4], p. 658.

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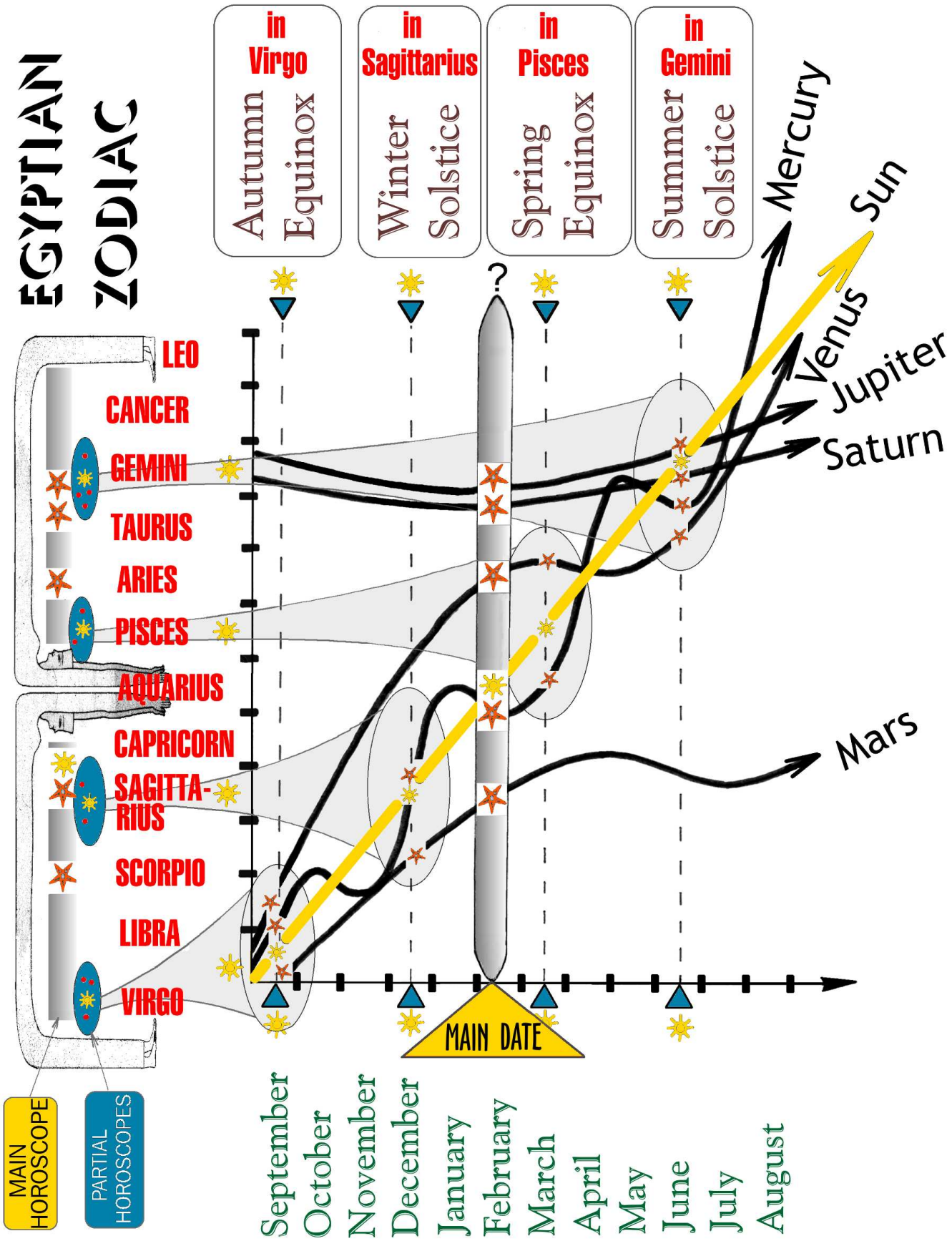


Figure 4.11: *Principal structure of an Egyptian zodiac.*

horoscope involving few planets. Consequently, such an astronomical picture becomes an important additional information for the zodiac dating.

It is clear that more information we have, better are the chances to obtain fewer admissible dates. In fact, if there is sufficiently large amount of additional information, it is possible that a unique and complete solution could be selected leading to reliable date for the zodiac. A planet which can provide us with particularly valuable information is Mars. Contrary to the planets Jupiter and Saturn, which move relatively slowly and during the whole year their positions do not change much, Mars is moving comparatively fast and its location on the main horoscope can be very different from its locations on the solstice and equinox days. It makes Mars a very important planet with significant impact on the astronomical dating.

One can ask a question: how it was possible for Egyptian astronomers and artists to avoid confusion between the planetary symbols of the main horoscope, i.e. the horoscope encoding the date for which the whole zodiac was created, and the partial horoscopes associated with the solstice and equinox points? In this book we provide an answer supported by many examples. In fact, the zodiacs were indeed designed very carefully to clearly separate the symbols of the main horoscope from those of the partial horoscopes.

Of course, one can wonder why all these facts about partial horoscopes on Egyptian zodiacs were not discovered in the earlier studies of Egyptian zodiacs. For example, even N.A. Morozov with his deep expertise in ancient astronomy was not able to recognize their existence. Let us emphasize that our claims are based on more substantial grounds than just an idea or impression. In fact, any kind of an explanation or a possible variant for interpretation of symbolizm on Egyptian zodiacs, should be verified based on the whole information available. Only after conducting elaborated computations and careful verifications such a choice can be made. Without massive astronomical calculations it is almost impossible, just by looking at the zodiac, to understand their underlying structure. In order to make these tasks possible, it is necessary to use advanced computational technology, which became only widely available in recent years. There were no computers n the time of Morozov and the amount of computations needed even for decoding of just one variant for a zodiac required several months of hard work. We must acknowledge that N.A. Morozov was aware of some elements of partial horoscopes but he didn't give them a serious consideration. In this way, he remained unaware of the whole zodiac's structure[2].

[2] See [114], for more details

4.3 Egyptian Zodiacs as Astronomical Pictures of the Whole Year Containing the Main Date

As it was explained in section 2.1, an Egyptian zodiacs is a recording of a particular date, which we call the *main date* of the zodiac. Based on our research, we claim that an Egyptian zodiac is in general an astronomical description of the whole calendar year during which the main date occurred. While the *main horoscope* encodes the main date, the *partial horoscopes* describe the four solstice and equinox days during that year. Sometimes, other symbolic scenes of particular astronomical meanings are also included in a zodiac. However, they are always related to the calendar year containing the main date. The structure of Egyptian zodiacs is illustrated on Figure 4.11, where one axis shows the time during one calendar year measured in months and the other one corresponds to the ecliptic divided into twelve zodiac constellations. The month of September is considered here as the first month of the calendar year, like it is indicated on most of Egyptian zodiacs. The curves show the planetary positions on the ecliptic through the year. For example, in order to find the position of Mars in December, we look where on the trajectory of Mars is located the point corresponding to December. On Figure 4.11, the dashed vertical line intersects the trajectory of Mars at the "height," which can be identified on the vertical axis as belonging to Scorpio. That means, in December of this particular year, Mars was in Scorpio. The trajectory of the Sun is marked by a yellow straight line placed across the picture. Of course, for different years the trajectories of the planets (except Sun) are different. Since the motion of Moon is very fast in comparison to the other planets, for the reason of simplicity, we did not include it in this diagram.

Based on the diagram shown on Figure **??**, let us create, as an example, an Egyptian horoscope for February 10th for that year. In other words, February 10th will be our main date, which on Figure 4.11 is marked by yellow triangle. The planetary positions on the main date are indicated on a gray pole (with a question mark on its top). The zodiac and the horoscope for this main date is illustrated on the left from the diagram. Notice that the planetary positions in the main horoscope correspond exactly their positions indicated on the gray pole, i.e. the actual planetary locations on the main date. As it was already mentioned, Egyptian astronomers and artists, created their zodiacs not only as astronomical picture showing the planetary positions on the main date, but they also supplied additional astronomical information. Besides the main horoscope, there were also included the partial horoscopes related to the planetary positions near the Sun on the four equinox and solstice days. We encircled the vicinity of the Sun on these four dates and the planets included inside these ovals make up the four partial horoscopes for that year, which are symbolized by blue ovals on the right side of the main horoscope. We should point out that this is only a schematic picture illustrating the main features of an Egyptian zodiac. In real zodiacs the main and partial horoscopes usually share

the same space. As our purpose is to find the main date of an Egyptian horoscope, we have placed in our diagram a question mark above the pole indicating the main date. The question mark is simply a reminder that in order to identify the moment, when the astronomical situation shown in the zodiac took place, we need to carry out appropriate computations. In this case, a complete solution is a date belonging to the year where all the specified in the zodiac conditions are satisfied.

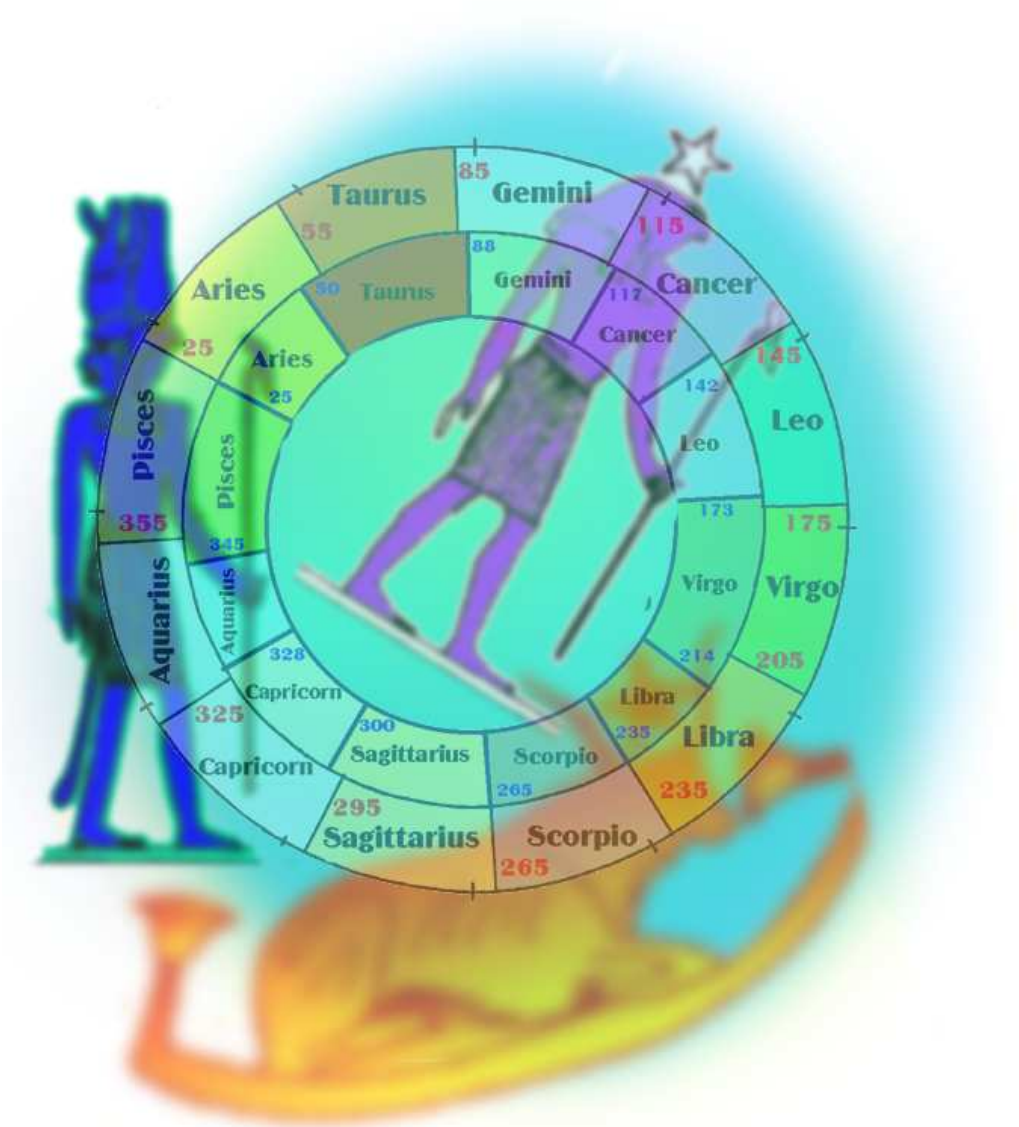
4.4 Dating of Egyptian Zodiacs with Equal Treatment of all Admissible Decodings

With discovery of partial horoscopes the dating of Egyptian zodiacs took a new dimension. The amount of the astronomical information now available is sufficient not only for finding a unique date for a zodiac, but in fact, also to verify the correctness of the used decoding. In the earlier attempts, based on the preliminary analysis, a decoding was chosen and only then used to carried out the calculation of the dates. Now, we do not select the "best" decodings but instead, we calculate the dates for all admissible decodings, and next compared them with the additional information. In this way, the correctness of a decoding is determined as a result of calculations. This method became possible due to the fact that there is now enough astronomical information available to exclude, for most of the considered zodiacs, random dates resulting from incorrect decodings. It is statistically impossible to have a date in the historical time interval, which corresponds to incorrect decoding and in the same time satisfies all the astronomical conditions retrieved from the zodiac. Let us point out that for a successful application of this method to obtain a reliable dating of anEgyptian zodiac, it is not necessary to have all the four partial horoscopes present on the zodiac. However, if there are two or even one partial horoscope available, with astronomically significant information, it is already sufficient to determine which decoding is correct and find the unique main date. Of course, in order do assure that the obtained result is correct, in each particular case, we must use all the accessible astronomical information.

To be more specific, we should clarify that not every decoding is admissible. It is possible to create imaginary decodings, just by arbitrarily assigning astronomical meanings to the symbols of a zodiac. But, the principle of our method would require that the same rule should be applied to the all other studied zodiacs with no exception. That means that the same type of a symbol in a similar context, but on different zodiacs, should always have the same meaning. In this way, it is possible to eliminate many unrealistic decodings. By applying the rule that the same symbol on different zodiacs should be treated exactly in the same manner, we are able to significantly reduce the total number of possible variants of admissible decodings for the analyzed zodiacs. Still, in the case of many zodiacs there are dozens of variants, which should be analyzed and calculated.

Chapter 5

Symbolism on Egyptian Zodiacs and New Complete Decoding



5.1 Symbols of Constellations on Egyptian Zodiacs

In general, the figures denoting constellations on ancient Egyptian zodiacs are very similar to their medieval European representations, so there is no problem with the recognition of their meaning. Nevertheless, some of the Egyptian symbols of constellations possess unique features which are not present in the medieval European manuscripts. These features, which were not recognized by previous researchers, are important for understanding the symbolic language of Egyptian zodiacs. More precisely, certain planetary symbols were sometimes integrated into a constellation symbol, which appeared as a complex "astronomical hieroglyph." We will discuss such "astronomical hieroglyphs" later in the section devoted to the partial horoscopes. This section is devoted mostly to the symbolism of constellations and we will only briefly examine the planetary symbols present in the complex constellation figures.

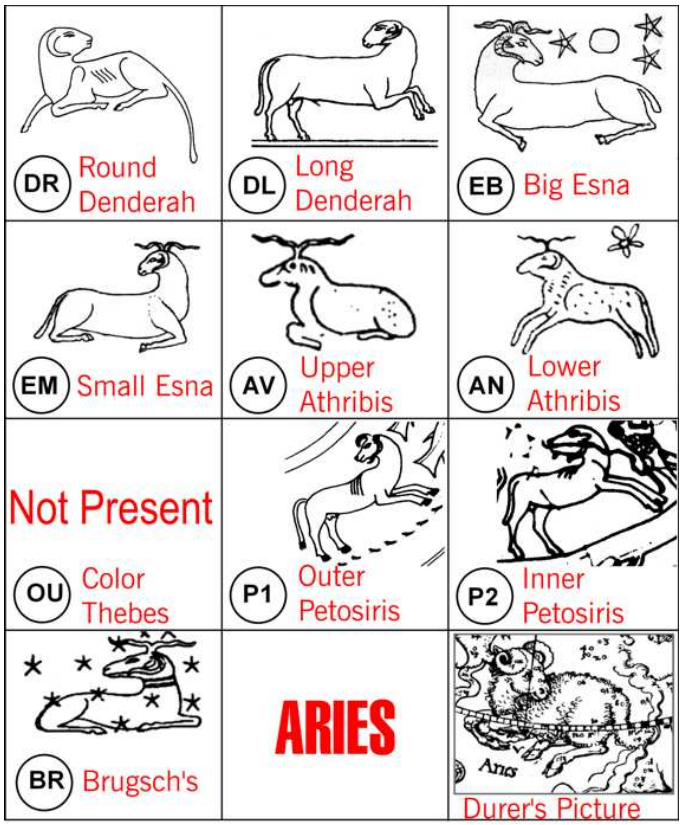


Figure 5.1: *Representations of Aries on different Egyptian zodiacs and in the European astronomy.*

Below, we analyze the Egyptian symbols of all the twelve zodiac constellations.

5.1.1 Aries

On Figure 5.1 we show the figures representing Aries on different Egyptian zodiacs, and for comparison, we also include a picture of Aries made by A. Dürer[1] in 1515 (see Figure 5.2).

Figure 5.2: *The star chart of the Northern hemisphere made by Dürer's (color added for better contrast). The zodiac constellations are placed around the ecliptic illustrated as a circle.*

It is not hard to see that the symbols of Aries on the Egyptian zodiacs, shown on Figure 5.1, are similar to the Dürer's drawing from the 16th century. We should remember that according to the conventional chronology, there is more than fifteen hundred years of difference between them.

5.1.2 Taurus

Next constellation after Aries is Taurus. On Figure 5.3 we show the symbols representing Taurus on the Egyptian zodiacs and compare them with the Dürer's drawing. Again, there is no problem with recognizing this constellation and there is also a clear resemblance with the Dürer's drawing.

Note that all the symbols have the same type of crescent-like horns. We would like to point out that on Egyptian zodiacs there may be many figures, in particular symbolizing planets, with different shapes of horns. The shape of horns seems to be important in Egyptian astronomical symbolism. For example, we will see later that Saturn is often shown

[1] See [28], p.8.

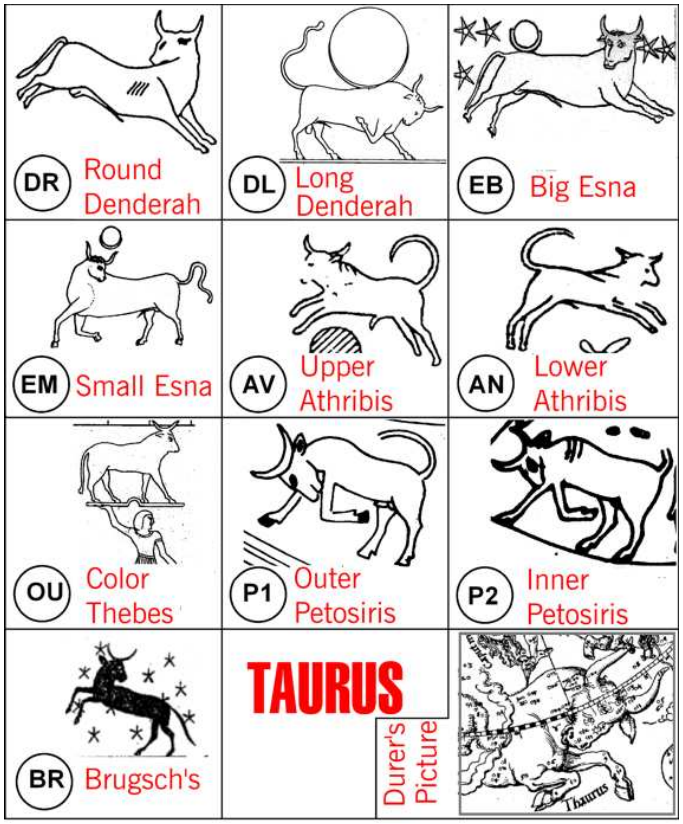


Figure 5.3: *Representations of Taurus on different Egyptian zodiacs and in the European astronomy.*

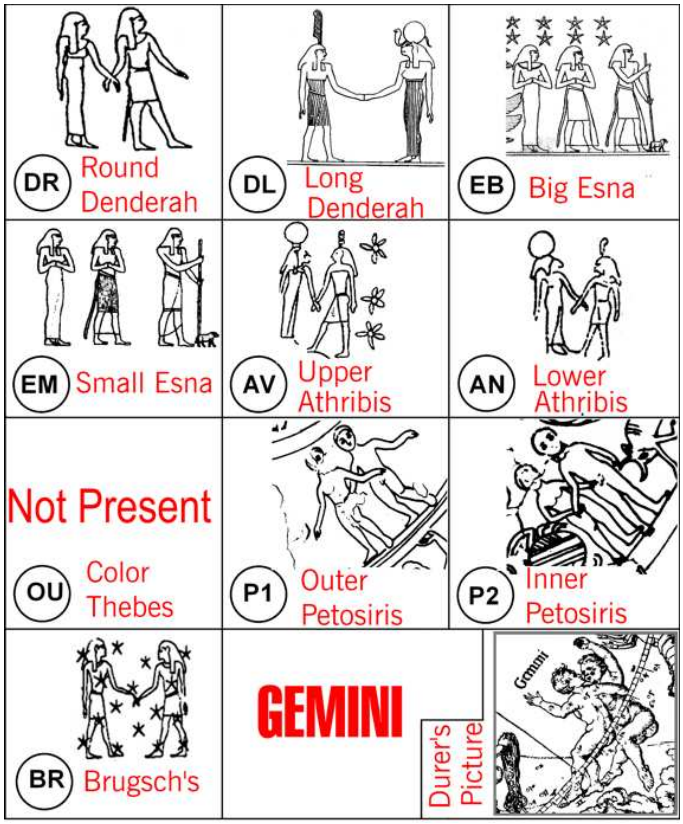


Figure 5.4: *Representations of Gemini on different Egyptian zodiacs and in the European astronomy.*

with horns like Taurus, and Jupiter with horns of different type similar to the horns of Aries.

5.1.3 Gemini

The next constellation on the ecliptic is Gemini. On Figure 5.4, we show the representations of Gemini on the zodiacs and compare them again with the picture of A. Dürer. On Figure 5.5, we also show a photograph of the symbol of Gemini on the Long Denderah zodiac.

On Dürer's picture Gemini is shown as a couple of children hugging each other. A similar symbol of Gemini one finds only on the Petosiris zodiacs. On all other zodiacs Gemini is depicted in different ways. In fact, there are two distinct patterns among these symbols. The first shows Gemini as a couple, a male and female figures holding hands. The female may have a lion's head with a circle on the top of it, while the male figure has a feather on the top of its head (see DL, AV and AN). Another pattern is characterized by three figures, a male and a female figures with hands crossed on the chest, and another male figure in front of them with a long stick (notice that this stick is different from a planetary "walking stick", which always have a handle on its top). We should mention that there is a simple way to distinguish male and female figures on Egyptian zodiacs. It is the size the step that

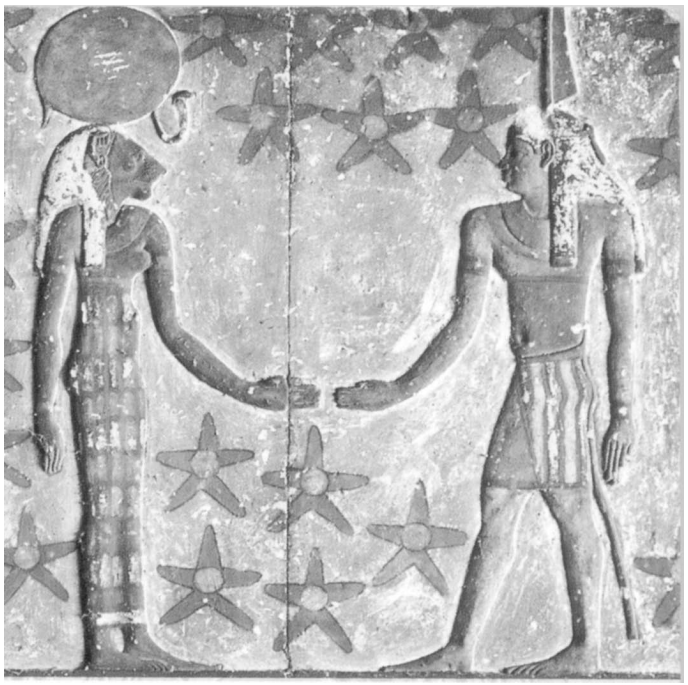


Figure 5.5: *Gemini on the Long Denderah zodiac.*
(Taken from [10])

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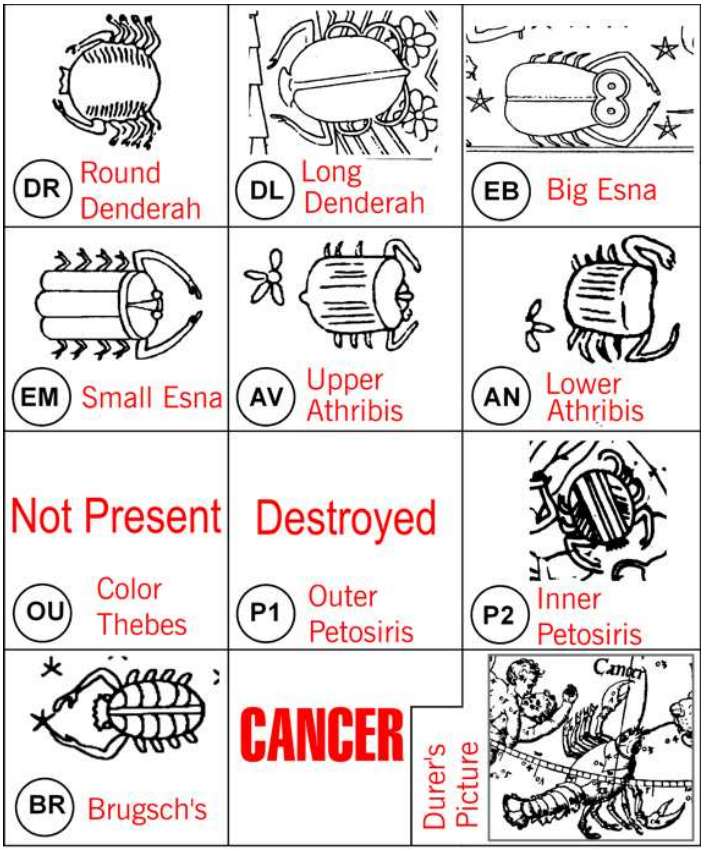

Figure 5.6: *Representations of Cancer on different Egyptian zodiacs and in the European astronomy.*

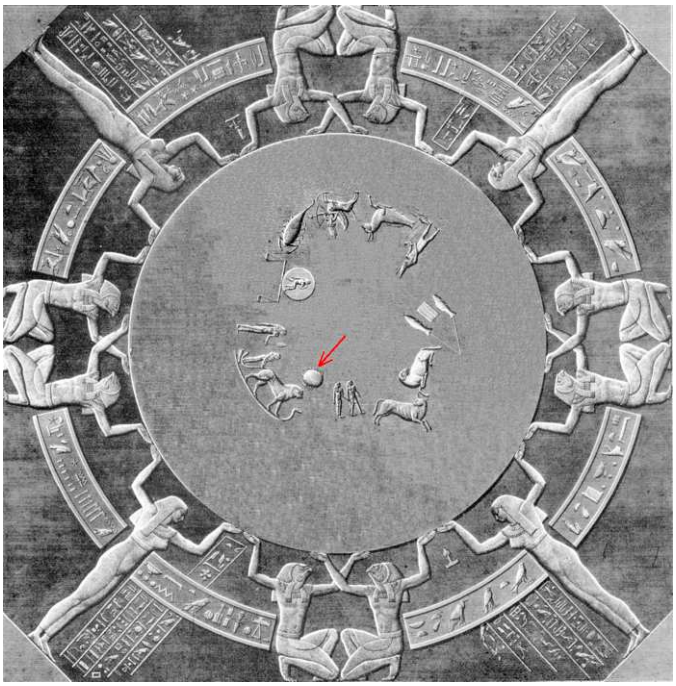

Figure 5.7: *Position of Cancer on the Round Denderah zodiac. All non-constellation symbols were removed from the zodiac for better clarity*

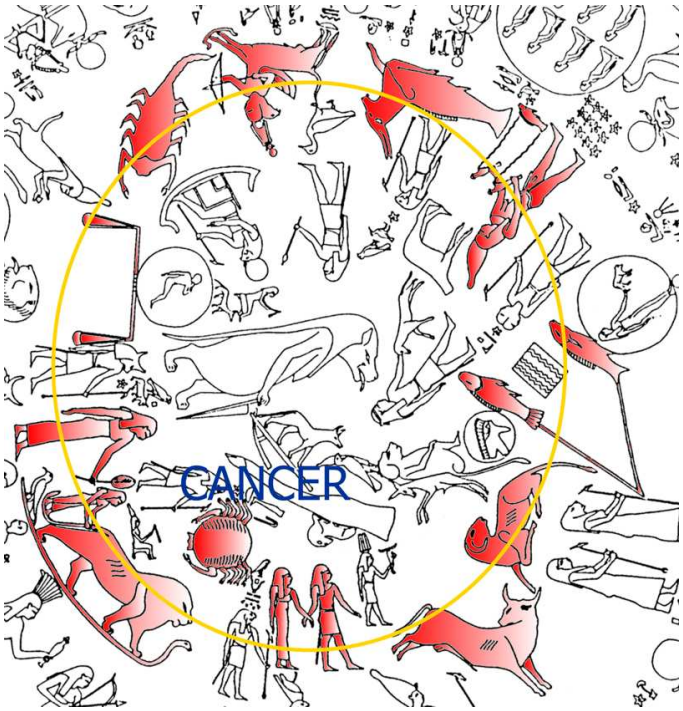

Figure 5.8: *Position of Cancer on the Round Denderah zodiac.*

is always small for females and much bigger for males. We will discuss later more details and present a proof for this claim.

5.1.4 Cancer

The constellation of Cancer follows Gemini on the ecliptic. On Figure 5.6 we show Cancer on the Egyptian zodiacs and compare it again with the Dürer's picture.

Let us notice that the position of Cancer on the Round Denderah zodiac is not aligned with the other constellations — it sticks out of the "zodiacal circle" (see Figures 5.7 and 5.8).

At the first glance one can think that Egyptian artist didn't plan well the arrangement of the zodiacal constellations, and since there was not enough space left for the symbol of Cancer he was forced to move Cancer aside. For example, N.A. Morozov and other investigators of Egyptian zodiacs believed that this was indeed a reason for Cancer's displaced position on the Denderah zodiac. Accepting such an explanation would imply that the astronomical accuracy of an Egyptian zodiac could possibly be distorted by Egyptain artists who created the design of the zodiac. But, we claim that this is not the case. For example, if we look at the position of Cancer on the Long Denderah zodiac, then it is also displaced but here it clear that it was done intentionally (see Figure 5.9). In

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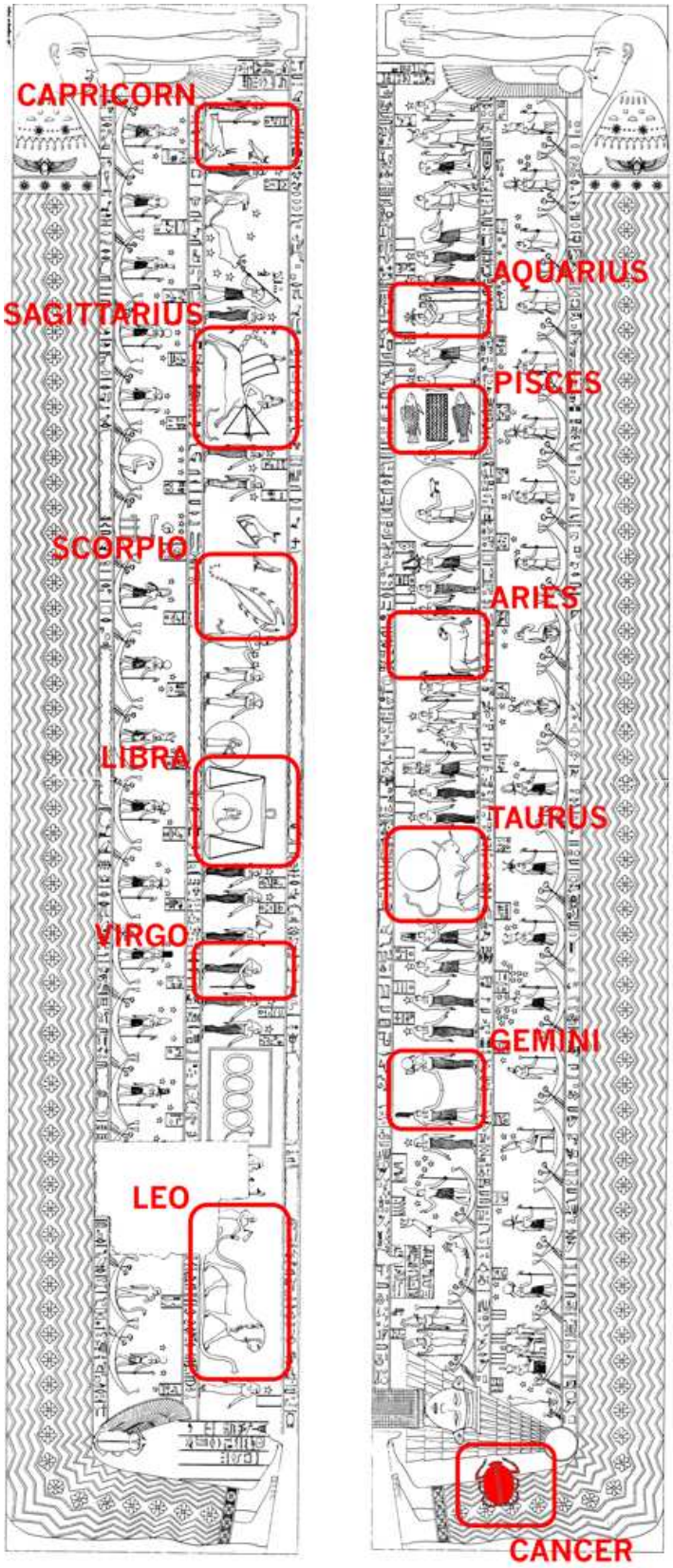

Figure 5.9: *Nonalignment of Cancer on the Long Denderah zodiac.*

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this book we assume that all the astronomical content of an Egyptian zodiac is accurate and we will look for the exact solutions. That means, we do not look for any excuse to accept a flaw in a solution by justifying it using non-astronomical arguments. This strict approach is also supported by the fact that we have obtained the exact and unique solutions for the all analyzed Egyptian zodiacs.

5.1.5 Leo

The constellation of Cancer is followed by Leo. On Figure 5.10, we show the representations of this constellation on the Egyptian zodiacs and compare them with the Dürer drawing. It is clear that Leo can be easily distinguished on all the Egyptian zodiacs. However, we would like to point out two important features of Leo present on different zodiacs.

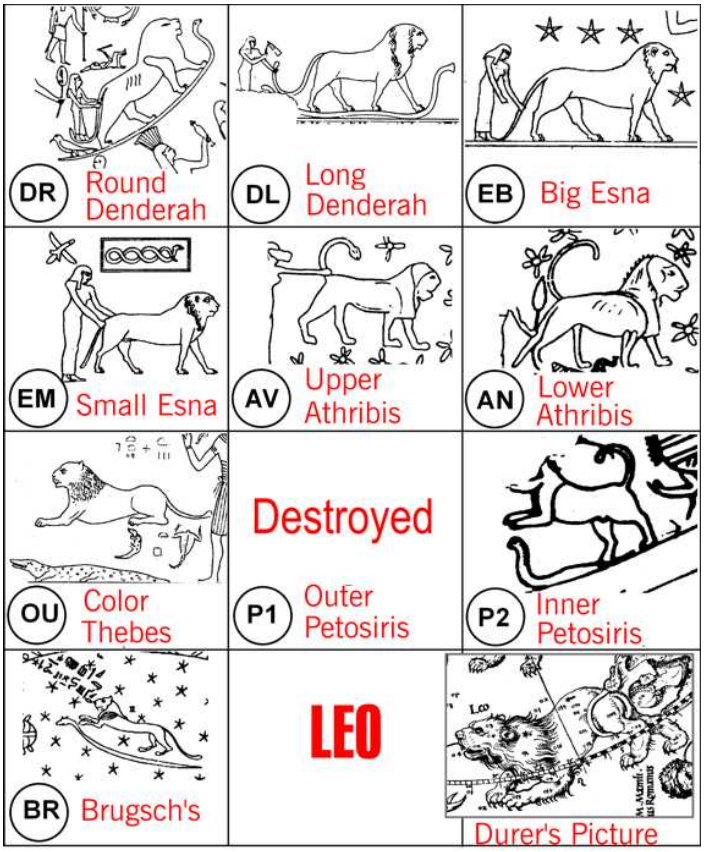

Figure 5.10: *Representations of Leo on different Egyptian zodiacs and in the European astronomy.*

On several zodiacs, there is a female figure usually standing on its tail or sometimes holding it in her hand. At the first glance, this female figure could be considered as a symbol of the next constellation of Virgo, but in almost all such cases there is another figure representing Virgo. The only exception is the Upper Athribis zodiac, where the female figure holding Leo by the tail is indeed Virgo. On the other hand, it is clear that this female figure has to be related to Virgo, so we will simply call it *secondary Virgo*. As a matter of fact, Virgo is represented by as standing female figure occupying much smaller space than Leo, whose body on a zodiac usually spreads horizontally over much larger area, but this is not the case on the real sky. Among all the zodiac constellations Virgo occupies the largest part of the ecliptic, while Leo occupies much smaller area. This disproportion causes some difficulty in picturing Virgo on the zodiacs or star charts. For example, on the medieval European star maps Virgo was shown in a laying position, what allowed Virgo to cover a larger apace. But on Egyptian zodiacs there was another way to expand Virgo over larger area on ecliptic. The little secondary Virgo standing on the tail of Leo indicates that this place belongs to Virgo. Notice, that Leo often stands on a snake. This is an important detail in Egyptian astronomical symbolism. We will present later many examples of symbols standing on snakes or boats. We claim, and will justify it, that it always means that the symbols using such attributes were shifted or expanded to another place on ecliptic or are even related to the time different from the main date of the zodiac. For example, Leo's figure is often placed on a snake to indicate that it expands "illegally" over the neighboring constellation of Virgo, which is in addition is indicated by the presence of the secondary Virgo.

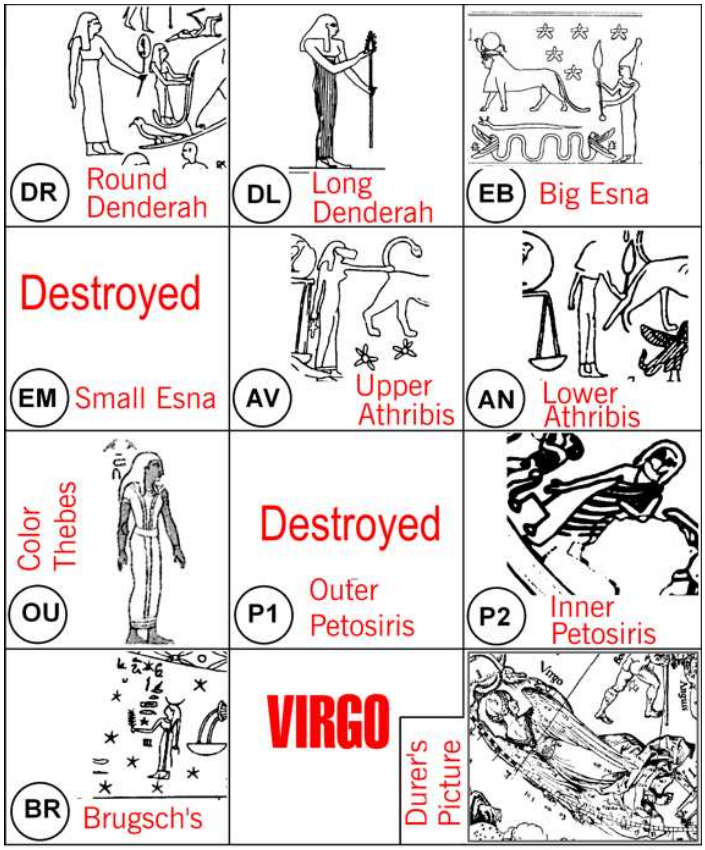

Figure 5.11: *Representations of Virgo on different Egyptian zodiacs and in the European astronomy.*

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5.1.6 Virgo

Now, we move to the next constellation of Virgo. On Figure 5.11, we show the representations of Virgo on the Egyptian zodiacs and on the A. Dürer's picture.

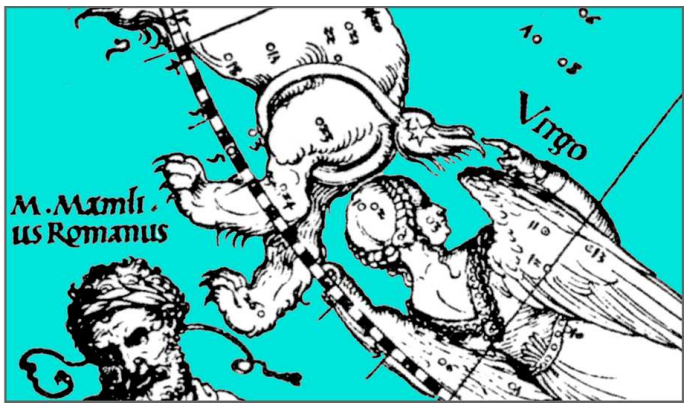

Figure 5.12: *Representations of Virgo and the star Spica at the tip of Leo's tail on the Dürer's drawing.*

There is no problem with recognizing Virgo on Egyptian zodiacs. It is almost always represented by a female figure holding a spike in her hand. The only exceptions are the Inner Petosiris zodiac P1, where Virgo is symbolized by a woman holding instead of spike a scale, and the zodiac (OU) from Thebes, where Virgo has nothing in her hands. The spike in Virgo's hand is not just a decoration, but it symbolizes one of the most bright and famous in ancient astronomy star called today α-Virgo. This star in ancient astronomy was called *Spike of Virgo* or *Spica* in Latin. On the Upper Athribis zodiac Virgo holds, instead of a spike, the Leo's tail with a tuft on the tail tip. If we look at the Dürer's picture, we will find a similar idea of showing the star Spica at the Leo's tail tip, which Virgo touches with her finger tip (see Figure 5.12).

5.1.7 Libra

We show on Figure 5.13 the various representations of Libra on the Egyptian zodiacs and the Dürer's picture. On all the zodiacs Libra is symbolized by a figure of a balance with two pans hung from bearings.

Notice a circle with a figure inside it, which is placed on the several zodiacs together with the balance. This circle is not a part of the Libra symbol but it simply indicates the Moon in Libra. We leave the discussion of these details for later. On the Big Esna zodiac, the balance is placed in a hand of a woman. Again, this woman is not a part of the Libra symbol nor it is a Virgo symbol. Indeed, the Virgo's position on this zodiac is on the other side of Libra, where it is represented by another female figure having all the attributes of Virgo (see Figure 5.11). We will prove that this figure represents Venus in Virgo from the partial horoscope of the winter solstice. However, on

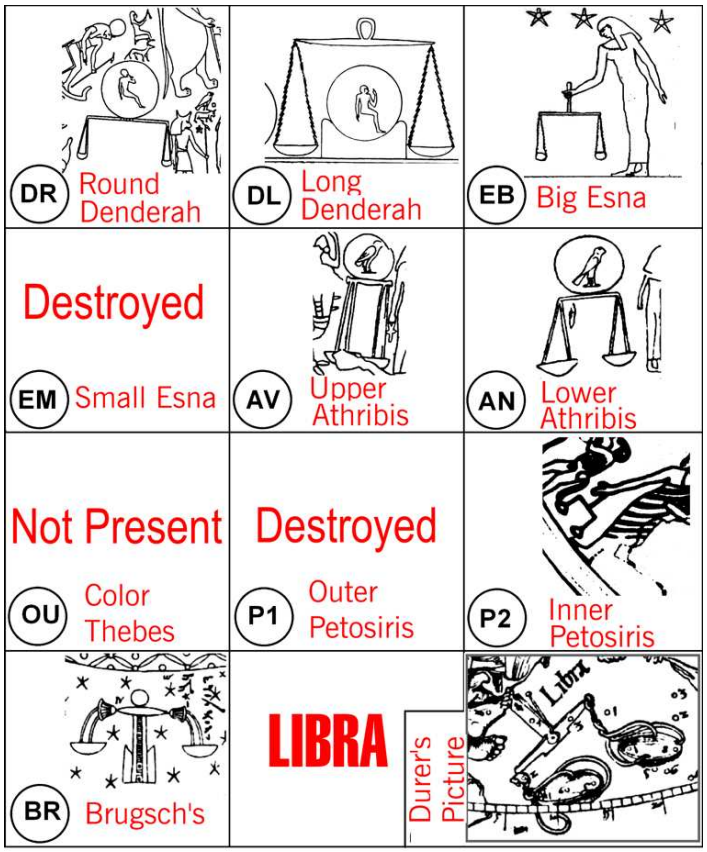

Figure 5.13: *Representations of Libra on different Egyptian zodiacs and in the European astronomy.*

the Inner Petosiris zodiac, a very similar female figure holding the balance in her hand is indeed a symbol of Virgo. Contrary to the previous case, this woman is located on the zodiac P2 in a position corresponding to the Virgo constellation (according to the orientation of the constellations on this zodiac) and it is the only possible figure here, which could be identified with Virgo.

5.1.8 Scorpio

On Figure 5.14 we show how Scorpio is represented on the Egyptian zodiacs. It is easy to recognized this symbol because of its elongated body and a curved tail tipped with a stinger.

Notice that Scorpio on the Dürer's picture is strikingly similar to the representation of Scorpio on the all Egyptian zodiacs.

5.1.9 Sagittarius

Now we move to the constellation of Sagittarius. The representations of Sagittarius on the Egyptian zodiacs and the Dürer's picture are shown on Figure 5.15.

On all the zodiacs Sagittarius is represented by a figure of centaur — an imaginary creature which is part horse and

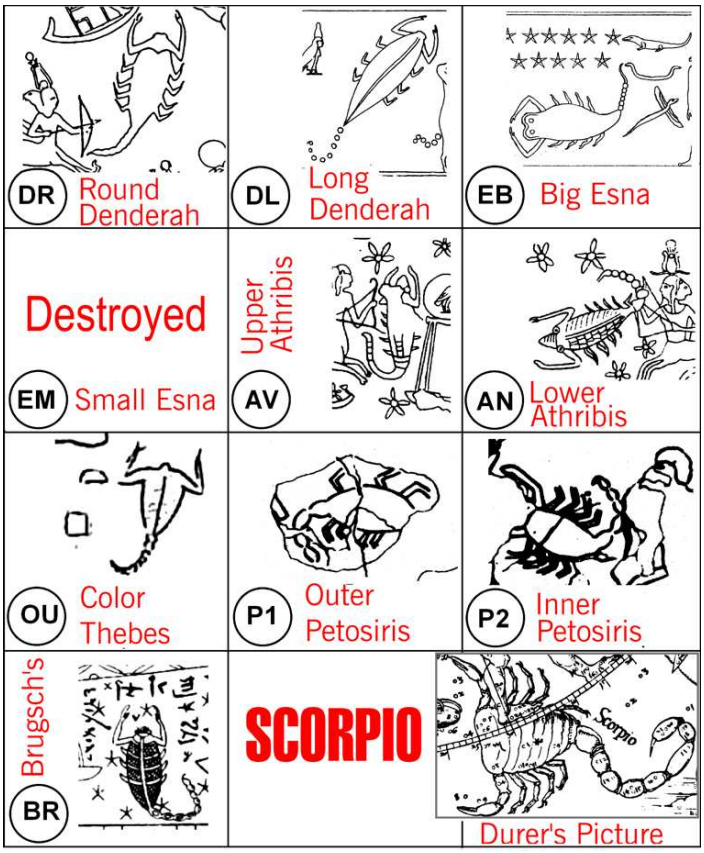

Figure 5.14: *Representations of Scorpio on different Egyptian zodiacs and in the European astronomy.*

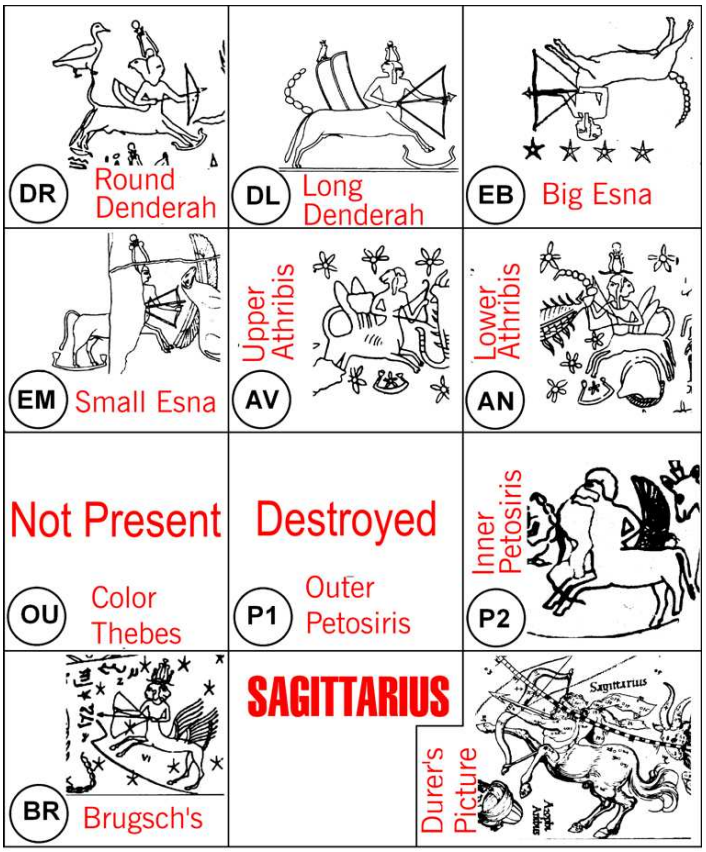

Figure 5.15: *Representations of Sagittarius on different Egyptian zodiacs and in the European astronomy.*

part man, aiming an arrow at Scorpio. Notice, that most of the centaurs shown on Figure 5.15 have wings and even the Dürer's centaur has also something floating above its back resembling wings.

As we already mentioned it in Chapter 4, during the last 2000 years the winter solstice takes place in Sagittarius, therefore the figure of Sagittarius on Egyptian zodiacs is usually accompanied by additional symbols. Practically all the centaurs on the Egyptian zodiacs have double-faced heads — one face of a human and another one of a lion. Particularly it is clearly visible on the zodiacs DL, EB and EV (see Figure 5.15). Let us point out that double face on Egyptian zodiacs is a feature associated with Mercury and lion's head with Venus, which are two planets always accompanying the Sun. Another attribute that can be recognized on most of the Egyptian zodiacs shown in Figure 5.15, which indicates that some "displaced" symbols are present here, is the boat under Sagittarius. On Athribis zodiacs there is also a star inside the boat, which could suggest that we are dealing here with "displaced" planets (remember that according to the ancient astronomy planets were considered as "moving stars"). There is also another detail pointing to the Sun. Namely, some of centaurs wear a crown with a small circle on its top. All together, these symbols convey a message that the Sun, Mercury and Venus are shown in this separated from the main horoscope position, in order to indicate their presence at proximity of the winter solstice point.

5.1.10 Capricorn

Now, we proceed with the next constellation of Capricorn. On Figure 5.16 we show the representations of Capricorn on all the studied here Egyptian zodiacs, together with the Dïer's drawing of Capricorn. The symbol of Capricorn, which is represented by a fantastic animal — a goat with a fishtail, can be easily recognized on the Egyptian zodiacs. We would like to point out a strange male figure standing on Capricorn on the Big Esna zodiac (see Figure 5.17).

The fact that this man is standing on Capricorn means that it is "displaced" and the presence of the small summer solstice attributes in his hands (see Figures 4.1, 4.2 and 4.3) probably indicates that Sun's trajectory begins to rise here to the summer solstice. In other words, the Sun which just passed in Sagittarius its lowest point is now in Capricorn and it begins its cycle in the direction to the highest position, i.e. the summer solstice. So, there is no ground for speculating that this figure stands for a planet in a partial horoscope (notice that it could not belong to the main horoscope because

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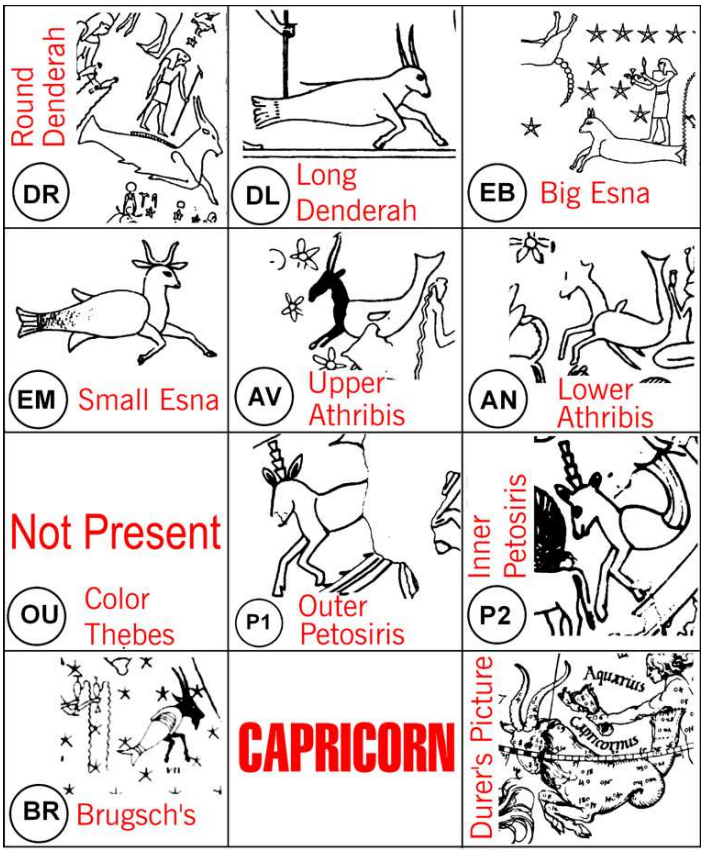

Figure 5.16: *Representations of Capricorn on different Egyptian zodiacs and in the European astronomy.*

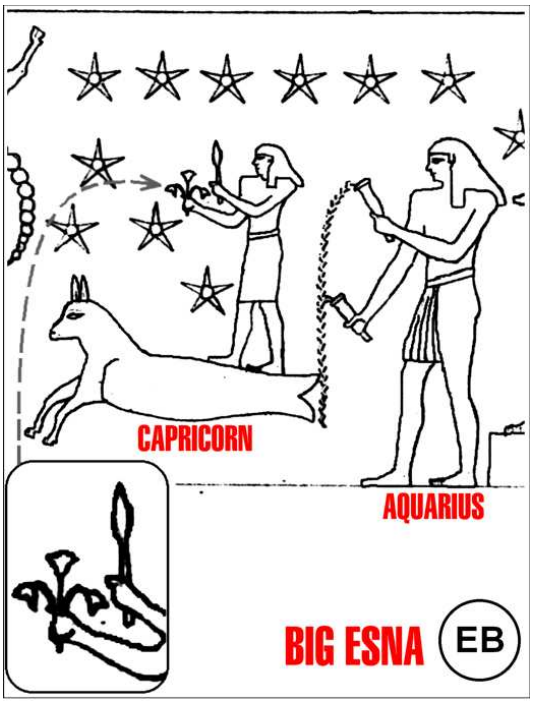

Figure 5.17: *Figure with tiny summer solstice attributes standing on Capricorn on the Big Esna zodiac.*

it is standing on something and has no walking stick in his hand).

5.1.11 Aquarius

We move now to the symbol of Aquarius. On Figure 5.18 we show the representations of Aquarius on the Egyptian zodiacs and in the European medieval tradition. On the Egyptian zodiacs Aquarius is shown as a male figure pouring water from two jars in his hands.

On the Round Denderah zodiac we can see that Aquarius pours the water over a fish. It is worthy to mention that in Old Christian tradition the fish was a symbol of Christ[2], so the symbol of Aquarius pouring water over a fish strangely reminds us a picture of John The Baptist baptizing Christ. This remark was made by N.A. Morozov[3]. The parallel between John The Baptist and the Egyptian symbols of Aquarius is supported by additional elements surrounding Aquarius. On the zodiacs DR, DL and EM, Aquarius is accompanied by a sequence of figures suggesting beheading, which is another parallel with the story of John The Baptist. We may think that it is very strange to find Christian symbols on ancient Egyptian zodiacs. However, as we will see it later, there are in fact even more Christian symbols present on these zodiacs, which is not so surprising when we realize their decoded dates.

5.1.12 Pisces

The last zodiac constellation is Pisces. On Figure 2.19 we show the representations of Pisces on the Egyptian zodiacs and compare them with the European symbol of Pisces depicted on the Dürer's drawing. It is always symbolized by a pair of fish, which are often connected by a thread. As long as there is a figure representing Pisces, there is no difficulty in recognizing it, or any other zodiac constellation, on Egyptian zodiacs. However, this is not always the case. On some Egyptian zodiacs there is no constellation figure present or sometimes only few of them are indicated by typical figures. We will call them the *Thebes type zodiacs*, because they mostly come from Luxor that is located at the place of ancient Thebes. On the Thebes type zodiacs the zodiacal belt was probably divided into several parts. It is unknown to us how these parts are related to the constellations or where they are located on the ecliptic (see Figure **??** and its enlarged fragment on Figure 5.20). However, it is possible to recognize there the symbols of planets, what definitely means that there is a horoscope encoded in such a zodiac and consequently there is also a particular date hidden in it. Still, it is sometimes possible to date such zodiacs, if there are at least some constellations indicated on such zodiacs.

[2] See [29] or Encyclopædia Britannica.
[3] See [4], Vol. 6, p.679.

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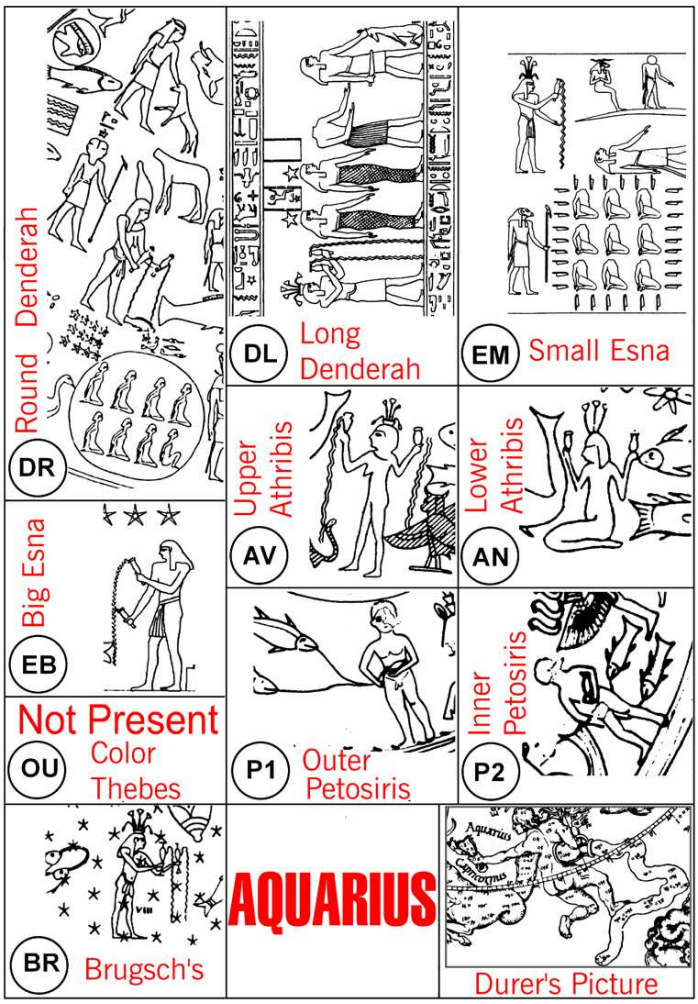

Figure 5.18: *Representations of Aquarius on different Egyptian zodiacs and in the European astronomy.*

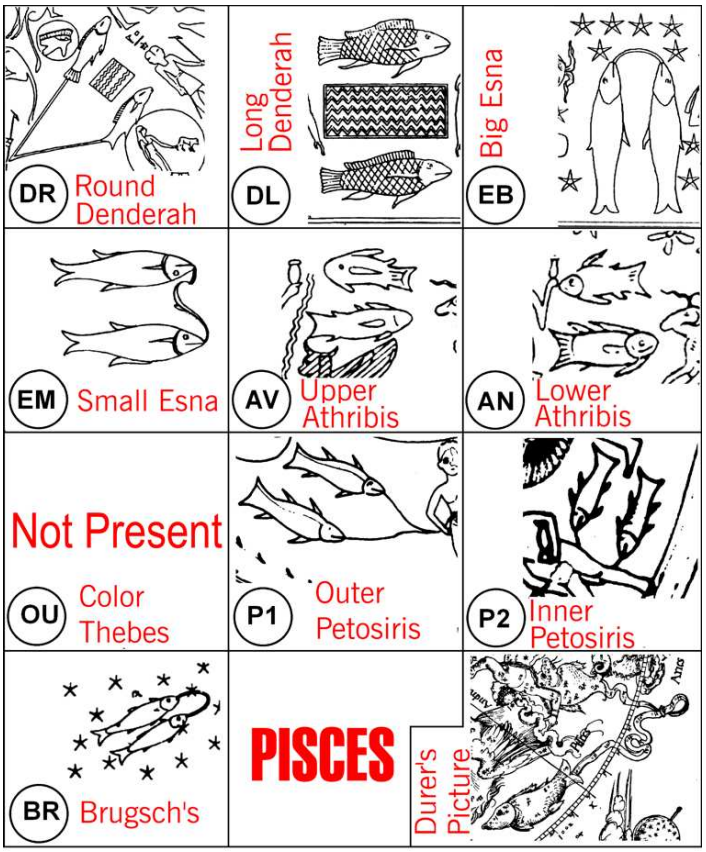

Figure 5.19: *Representations of Pisces on different Egyptian zodiacs and in the European astronomy.*

On Figure 5.20, the ecliptic is divided into 36 parts by small marking above the figures in both, upper and lower part of the zodiacs. There are 18 parts in the lower part and 18 parts in the upper one.

Let us consider the Color Thebes zodiac, which we denoted by the letters 'OU'. It is also a zodiac of Thebes type but it contains few symbols of constellations, namely, it shows only these zodiac constellations in which there were planets present on the main date. These constellations are displayed together in the center of the zodiac (see Figure 5.21) and the planetary symbols are placed around them.

5.2 Symbols of Decans and Principal Scale on Egyptian Zodiacs

5.2.1 Decans on the Long Denderah Zodiac

We have already mentioned that on some Egyptian zodiacs, in particular on the zodiacs of Thebes type, instead of the constellations the ecliptic is divided into 36 parts, each of them representing a sector 10^o long in average. The time needed for Sun to travel across such a sector is approximately 10 days in average. For these reasons we will call these sectors *decans*. For each of the twelve zodiac constellations correspond in average three decans. It is quite probable that on the Thebes type zodiacs the constellations are present in a form of triples of decans. This idea is supported by the structure of the Long Denderah zodiac. It was already noticed by N.A. Morozov[4], that each zodiac constellation is accompanied by two additional figures of girls, often with stars over their heads. All these girls are alike, except few of them, which symbolize supplementary astronomical information that we will explain later in this chapter. These 24 figures and 12 zodiac constellations represent 36 figures dividing the ecliptic into 36 sectors. For each constellation corresponds three decans symbolized by these three figures, one of them being the constellation symbol itself. Following these idea we can analyze all the figures on the Long zodiac and verify if it is possible to divide them into 12 subsequent triples, each of them composed of two female figures and one zodiac symbol. It turns out that it is feasible and in fact there is only one way to do it! This partition into subsequent triples is shown on Figure 5.22, where we used the numbers 1, 2 and 3 to indicate the figures belonging to the same triple. We used different colors for different

[4] See [4], Vol. 6, p 675.

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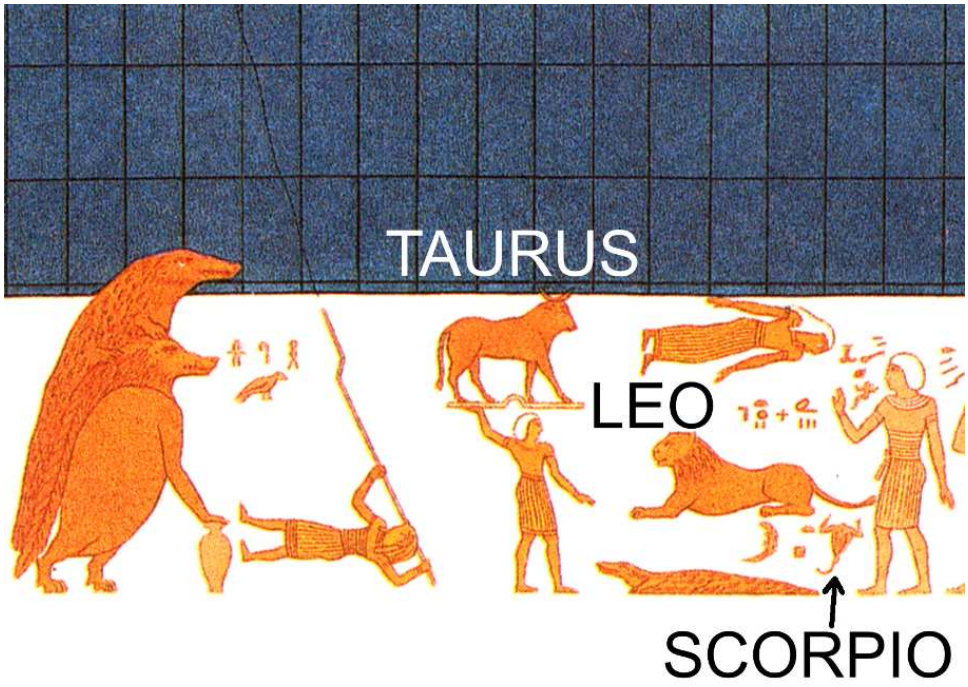

Figure 5.21: *The zodiac constellations on the Color Thebes zodiac (OU).*

triples. For each triple, one of the numbers 1, 2 or 3 is encircled to indicate the figure of the constellation. We colored all the constellations in red and other decans symbols in brown.

Let us show that indeed it is the only way the decans can be divided into triples. Notice that there is only one decans symbol between Aquarius and Pisces, so there are only two possibilities: it belongs to Pisces or Aquarius. For each of these two options we can try to extend this partition (in a unique way) over the whole zodiacs. If we assume that this decans symbol belongs to Aquarius, we will obtain a partition with one triple containing no zodiac symbol. On the contrary, if this symbol belongs to Pisces, the partition into triples extends in a unique way over the whole zodiac and there is exactly one zodiac figure in each triple.

5.2.2 Principal Scale on Egyptian Zodiacs

The presence of decans on an Egyptian zodiac gives us a hope that the positions of the planets in main horoscope are specified here more precisely. For example, a creator of the Long zodiac could indicate the location of a planet, by placing it in between appropriate decans, with accuracy up to 20^o in average. Unfortunately, this is not the case. If we look again on the Long Denderah zodiac, we will find out that all the planetary figures from the main horoscope, except the Sun and Moon, are placed exactly in between the constellation triples (look for the symbols with the walking sticks on Figure 5.22). All the figures with walking sticks inside the triples stand either on a boat or hold the walking sticks over another symbol. This indicates that these figures are not parts of the main horoscope, but belong to the partial horoscopes. By taking advantage of the decans, the position of these partial horoscope symbols on the Long zodiac can be specified more accurately. We will show that in the final solution for the Long zodiac these partial horoscope positions are exactly as on the Long zodiac. But, as we explained, the main horoscope is not so accurately presented on the Long zodiac.

Notice that among all the decans represented by the brown females on Figure 5.22, all of them except one look in the one direction, which is the direction of the whole procession along the zodiac. This figure is located between Cancer and Gemini, and it belongs to the Cancer triple. One can ask the question: what this change in direction could mean? In order to suggest an answer, we should look at the set of figures between Cancer and this decan. There are three boats and a pole with a bird on the top of it. We already discussed them as symbols of the summer solstice which occurs in Gemini. As they are following the first decan of Cancer, we could think that their place is in Cancer, and indeed it would happen if the first decan was oriented in the same direction as the whole procession. However, this is not a case here, because the way the first decan is represented on the Long zodiac shows that the summer solstice figures stand in front of her (and not behind), which clearly indicates that she is following these summer solstice symbols. By this example we would like to point out how careful should be the analysis of the Egyptian symbols in order to find the correct decoding. Even the smallest details may contain some important information.

Let us stress out that an Egyptian zodiac is often a very complex astronomical picture showing a large amount of astronomical information, and because of it, its structure and symbolic language could be quite complicated. Nevertheless, we will show that these zodiacs are practically flawless re-

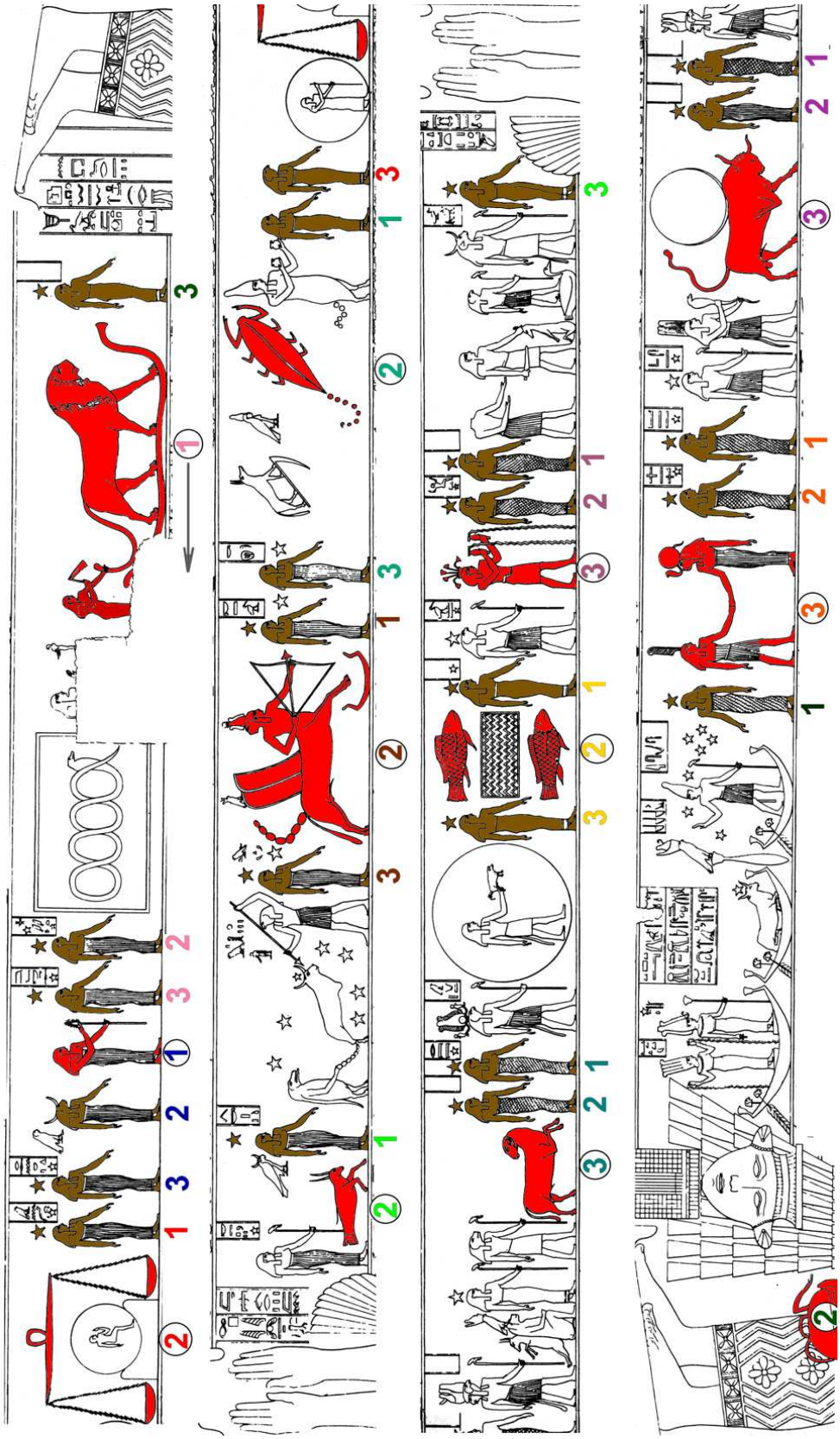

Figure 5.22: *Symbols of decans on the Long Denderah zodiac.*

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Figure 5.20: *Enlarged fragment of the Thebes zodiac from Figure 2.1. There are no constellations signs and the ecliptic is divided into 36 parts.*

garding their astronomical contents and their accuracy can be fully trusted. Since this is not an attitude shared by specialists in Egyptian astronomy and zodiacs, many researchers easily assume that the astronomical contents of the Egyptian zodiacs is not very precise and could be corrupted because of artistic or other reasons. We would like to use our research against this attitude that we consider to be wrong.

5.3 Male and Female Figures

In order to understand how it is possible to distinguish male and female figures on Egyptian zodiacs, even in the case the quality of a picture is very low, we need to look first at some examples. On Figure 5.24 we reproduce a collection of Egyptian symbols from [7]. We claim that most of symbols on Figure 5.24 equipped with walking sticks, represent some planets which can be found on Egyptian zodiacs.

Figure 5.23: *Painting of a dead person and a wooden sarcophagus.* (Taken from [116], pp. 152 and 161)

Let us discuss symbols on Figure 5.24. They show important features of Egyptian symbolism. For example, we can notice that the length of a step for female figures is much shorter than such length for male figures. Therefore, it is possible to easily distinguish on Egyptian zodiacs which figures

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are male or female, even if the picture with a zodiac is unclear or damaged. Of course this distinction is very important for a correct decoding of an Egyptian zodiac. In the case we are dealing with such a female figure, it could only represent planets Venus or Moon, while the other planets are always represented by male figures. There are also some figures to which this rule can not be applied, because they are shown in a standing position in profile with only one leg visible. On Figure 5.24 there are four such symbols shown in the second row from the bottom. There is some resemblance between these figures and mummified bodies or bodies in Egyptian anthropomorphic sarcophagi (see Figure 5.23). They represent deads.

5.4 Planetary Symbols of the Main Horoscope

5.4.1 Planetary Walking Stick

It was already noticed by the 19th century investigators that there is a rule allowing to recognize the most of the planetary symbols on the Egyptian zodiacs by a walking sticks held in their hands. Moreover, this *planetary walking stick* is not just a simple rod but it must be equipped with a handle on its top (see Figure 5.24). Most often such a handle has a hooked T-shape (see Figure 5.25) but it can also be bulb-shaped.

Figure 5.25: *Planetary walking stick hold by a sitting figure with falcon's head.* (Taken from [116], p. 177)

N.A. Morozov in his investigation of the Egyptian zodiacs illustrated the planetary symbols on a picture which we reproduce on Figure 5.26.

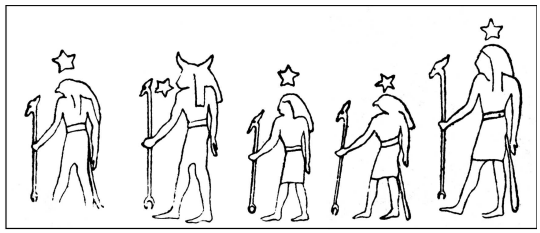

Figure 5.26: *Typical planetary symbols on Egyptian zodiacs recognized by N.A. Morozov.* (Taken from [4], Vol. 6, p. 956)

Let us recall that a walking stick in medieval symbolism was used to indicate a traveler. Probably, for the same reason in the Egyptian astronomy a walking stick was chosen as an attribute of a planet. In the old times the planets were considered to be the *traveling stars*. Indeed, for an observer, who at that time had no telescope, the planets looked exactly as stars with the only noticeable difference that they were changing their positions with respect to the fixed stars. The real stars practically do not change their positions with respect to each other and the same configurations of stars were observed through many centuries. This spherical picture could be imagined as a *sphere of fixed stars* on which the planets move around the big circle, which is the ecliptic, following the same general direction. However the motion of some planets is not uniform and it is changing all the time. Sometimes they stop, move backward, turn back and move forward again in common for all planets direction (see Figure 5.27).

In old chronicles planets were described as *wandering stars*[5] and today's modern world *planet* originated from the Greek word *planets*, which means *wanderer*. We've already explained that in ancient astronomy the Sun and Moon were also considered as planets, because they are moving around the ecliptic in the same common planetary direction. In this book we will also refer to the Sun and Moon as planets. Of course, from the point of view of the modern astronomy it is not correct, but this convention is helpful to simplify the discussion of the old astronomical symbolism. As we already mentioned, the fact that a walking stick was used on the Egyptian zodiacs as a planetary attribute was well-known to researchers in the 19th century, and it was also used by N.A. Morozov, as well as by Egyptologists, to recognize planets on Egyptian zodiacs. For example, in the modern work by French Egyptologists S. Cauville[6] all the recognized by her planetary figures on the Round Denderah zodiac are equipped with walking sticks of exactly the same shape as on Figures 5.25 and 5.26.

[5] See [25], p. 195.
[6] See [10].

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Figure 5.24: *Collection of Egyptian "gods" and "goddesses" most of which are planetary symbols.*

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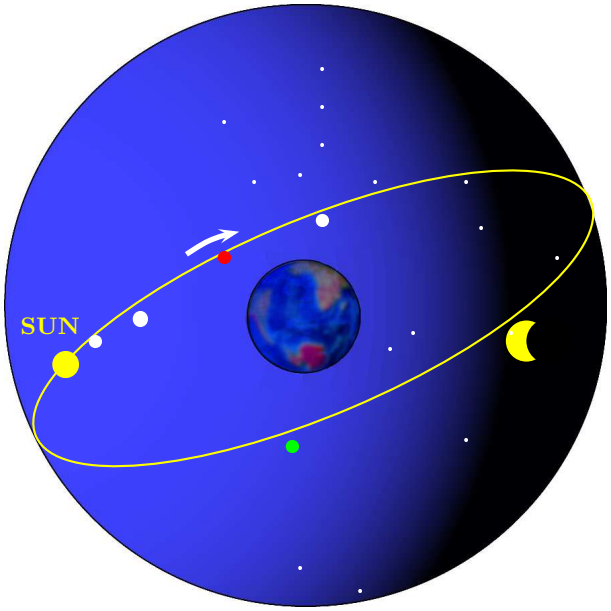

Figure 5.27: *Sphere of fixed stars and the motion of the planets along the ecliptic.*

However, if we look at an Egyptian zodiac there may be more figures with the planetary walking sticks than required. With a naked eye one can only distinguish five planets without counting the Sun and Moon. They are: Saturn, Mars, Jupiter, Mercury and Venus. Notice that on the Long Denderah zodiac there are ten figures holding planetary walking sticks and on the Round Denderah zodiac there are nine such figures. Certainly, on the Egyptian zodiac some planets could be represented by several symbols with walking sticks arranged in a procession, but the number of such procession still could exceed required number five. The reasons for such large number of planetary symbols was already explained briefly in Chapter 4. In fact, there are usually additional partial horoscopes present in a zodiac, which could increase the number of planetary symbols. The previous researchers didn't realize the existence of such partial horoscopes. Therefore, they were forced to explained the additional planetary symbols in a conjectural way. For example, N.A. Morozov postulated that some of these symbols represented comets — it is impossible to check this claim by any kind of calculations. Comets, which are visible from the Earth are not classified and astronomers may not be even aware about those comets that had appeared near the Earth in the distant past. Still, appearances of comets is relatively rare, thus there is a small probability that Morozov's conjecture is true. In our work we do not need to make any unverifiable conjecture. We follow the principle that every figure with a walking stick or a procession of such figures symbolizes a planet, maybe in the main or partial horoscope. We will explain in subsequent sections how to distinguish between them. For example, if a figure holds just a simple stick, without the characteristic for a planetary stick handle at its top, it is definitely not a planet of the main horoscope. However, as the symbolism of the partial horoscopes is much less formal, such figure could represent a planet belonging to a partial horoscope.

There are also Egyptian zodiacs, on which planets are represented in a completely different way, not as travelers. For example, on the Athribis zodiacs, all the planets (except the Sun, Moon and Mercury) are shown as birds. On the Petosiris zodiacs, the planets are symbolized by busts without hands, and therefore, without planetary walking sticks as well. These zodiacs in some sense are exceptions.

Let us emphasize that the identification of planets on an Egyptian zodiac is the crucial element of the astronomical dating. The obtained by astronomical calculations date would be wrong if the planetary identifications on the zodiac were incorrect. However, there may be more than one possible variant for identifications of some planets. The decision, which of these variants is the right one, can only be made after all the calculations are completed. Let us explain how it is done. Suppose that on a zodiac there are several possible identifications for some of the planets, and there is no reliable *a priori* indication which one of them is true. Can we, in such a situation, find a correct identification? It turns out that it is possible for most of the Egyptian zodiacs. Mainly because of abundance of the additional information provided by the partial horoscopes, which were discovered by us (see [114]).

We proceed as follows:

- At the first stage, we consider as equal all the possible identifications and obtained for them astronomical solutions for the main horoscope, which belong to the historical time-interval from 500 B.C. till nowadays.
- Next, we compare these solutions with the additional information provided by the partial horoscopes. If there is any discrepancy we simply dismiss such a solution. It appears that in almost all the cases, there always remains the unique solution, even if there were dozens of solutions at the first stage.
- Finally, we return to problem of identification. We consider the variant resulting in the final unique solution as the correct identification. It appears that the final identifications for all the Egyptian zodiacs contains no contradiction among the symbols and their meanings. Actually, the same symbolic rules can be applied to all Egyptian zodiacs.

According to our procedure, we can classify all the planetary symbols into two categories:

•• The symbols that can be reliably identified before carrying on the calculations. Most of such symbols were already analyzed and identified by our predecessors, including Egyptologists — H. Brugsch, F. Petrie , astronomers — Ch. Dupuis, P. Laplace, J. Fourier, A. Letronne, K. Helm, J. Biot, E.B. Knobel, M.A. Vil'ev. The summary of

their huge work was made by N.A. Morozov[7], who made also some improvements and corrections.

- The symbols for which we do not have a definite rule at the first stage. Usually, there are not so many figures of this type, typically there are no more than one or two such symbols, but sometimes almost all figures fell into this category. We should keep in mind that for astronomical dating a change of even one planet can result in a drastic change of the date. Therefore, in the case there is any doubt, the identification should be based on analysis of all the possible variants.

The whole procedure of identification of planets will be presented in Chapters 7 and 8. For each zodiac, we will discuss our calculations, the results and their compatibility with the additional data, and finally we will produce the final identification. In this section we present only the final identification of all the planets on the investigated zodiacs. We will display this identification in the sequence of seven tables, one for each planet (including the Sun and Moon) separately. These tables will allow a convenient comparison of the planetary symbols on the Egyptian zodiacs studied in this book.

In order to distinguish a planetary symbol from the first ("*recognizable*") category from a symbol belonging to the second ("*calculated*") category, we use two different forms of the zodiac labels. We will use the labels with shaded background inside the circle to indicated the second category.

5.4.2 Saturn in the Main Horoscope

On Figure 5.28, we show the representation of Saturn on different Egyptian zodiacs, where the zodiacs (DR), (DL), (EB) and (BR), Saturn was recognized (before calculations), and on the others (with the shaded labels (EM), (AV), (AN) and (OU)) it was calculated. Saturn on the Petosiris zodiacs is not shown on Figure 5.28, because it isrepresented there in a different, non-typical for Egyptian zodiac form, and a comparison in this case would be unproductive. We will analyze Saturn on the Petosiris zodiacs separately. Concerning the Brugsch's zodiac we should explain why there are three different representations of Saturn shown on Figure 5.28(BR). This is related to the fact that on this zodiac instead of one, there are three main horoscopes. The one of them, which was dated by N.A. Morozov, has Saturn indicated by a Demotic inscription. In the two other horoscopes, which were found by us, Saturn is shown in a symbolic way. These horoscopes were already discussed in section 3.4 (see Figure 2.15), where we also assigned to them the names *Demotic Horoscope*, *Horoscope without Walking Sticks* and *Horoscope in Boats*, which will be used throughout this book.

The symbol of Saturn can be sometimes easily recognized by some of its characteristic features. The most distinctive feature is the presence of a crescent on the head of a male planetary figure. Another attribute of Saturn is the hieroglyph in a shape of a bull (see Figure 5.28 (DR) and (DL)). Whenever these features are present, all the researchers agree that it is an representation of Saturn[8]. In other cases, we have to consider many possible variants in order to compute the right identification. Such cases on Figure 5.28 are marked with shaded labels. We will discuss them later in detail in Chapters 7 and 8. In this section we will only analyze the cases when these characteristic features of Saturn are present, i.e. the "recognizable" cases (with un-shaded labels).

We being with the "recognizable" representations of Saturn on the zodiacs from the Egyptian temples. There are exactly three such cases shown on Figure 5.28, namely DR, DL and EB. On all these zodiacs we see the same planetary symbol, which is a male figure with animal's face, crescent on the head and standard planetary walking stick in his hand. Of course, the crescent shown on this figure's head could be the bull's horns (notice that the figure's face resemble bull's head), but still we will call it simply *crescent*. This terminology is completely unimportant for the astronomical dating, but we have our reasons for calling it crescent[9].

On the both Denderah zodiacs, the planetary male figure with crescent is accompanied by the same hieroglyphic inscription. The translation of this inscription, given in [10], reads: "*Horus le Taureau*" which means *"Horus the Bull"*. The exact translation of this inscription is not important for us, because we will not rely on it. The significant here is that the same inscription stands by the same planetary figure on the both Denderah zodiacs. This clearly indicates the same planet. What is that planet? The answer is provided in the previous works devoted to the Egyptian zodiacs. It is indeed Saturn[10]

Figure 5.29: *Two figures of Saturn on the Round Denderah zodiac: one (marked in yellow) in the main horoscope, another (marked in blue) in the partial horoscope of the autumn equinox (surrounded by a blue contour)*

[7] See [4], Vol. 6.

[8] See for example [4], Vol. 6, [10] and [11]

[9] See [105].

[10] See [4], Vol. 6, [1], [10] and [11].

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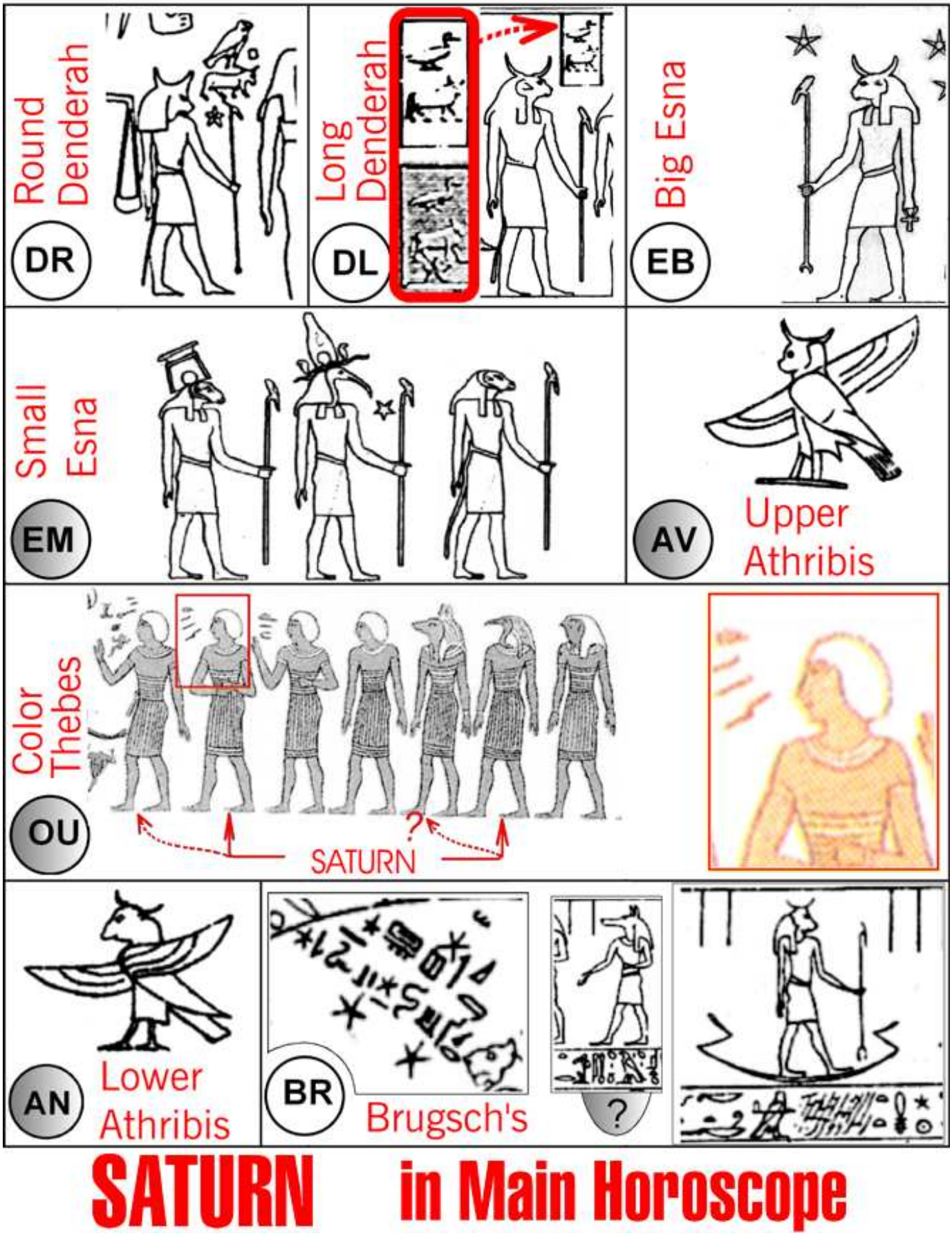

Figure 5.28: *Representations of Saturn in the main horoscope on different Egyptian zodiacs.*

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In order to explain this answer, let us point out that on the Round zodiac, just under this figure, there is another similar figure with a crescent on the head holding a scythe instead of a walking stick (see Figure 5.29). That figure is a part of the partial horoscope for the autumn equinox, so the planetary walking stick is not a requirement in this case. Except for the object held in their hands, these two figures are completely identical, so they definitely indicate the same planet. Just from this connection one can deduct that this planet is probably Saturn, because it moves so slowly that during the whole year its position usually stays inside the same zodiac constellation. Consequently, the positions of Saturn in the main and the partial horoscopes coincide. However, we can definitely recognize Saturn in this figure, because it is well-known that the scythe was an attribute of Saturn in old astronomy. For example, there are many pictures in medieval astronomy books showing Saturn with a scythe (see Figure 5.30).

Figure 5.30: *Saturn shown with a scythe on an old drawing found in a medieval astronomical book.* (Taken from [32].)

Consequently, this male figure with a crescent on the head should be considered as Saturn, what is noting new, because this identification was used by all the previous investigators of the Egyptian zodiacs. But, based on our analysis and the fact that with this identification a complete solution is obtained, we can confirm its correctness.

Notice that on the Athribis zodiacs Saturn is shown as a bird with a crescent on its head (see Figure 5.28 (AN) and (AB)), but coincidence is a result of our computations and not an *a priori* choice based on similarities. This identification appears to be the same as it was suggested by Flinders Petrie, but is different from the one chosen by N.A. Morozov[11]. There is one more "recognizable" case of Saturn on Figure 5.28 (BR). Here Saturn can also be identified prior to the computations. As we've already mentioned, there are three main horoscopes on this zodiac: Demotic Horoscope, Horoscope without Walking Sticks and Horoscope in Boats.

[11] See [4], Vol. 6, pp. 731-738.

All the three representations of Saturn are shown on Figure 5.28 (BR). In the Demotic Horoscope, the name of Saturn is written together with the name of Jupiter in two lines located near Leo's head. H. Brugsch translated this inscription as *"Hor-pe-seta"* and *"Hor-pe-ka"*, which means "Saturn" and "Jupiter". As the name of Saturn is simply inscribed in this horoscope, there is no problem with its identification.

Regarding the Horoscope in Boats, it is not difficultto recognize here Saturn, because it is represented exactly by the same symbol as on the Denderah zodiacs: a male figure with an animal/bull-like head and a crescent on the top of it holding a planetary walking stick in his hand (see Figure 5.28 (BR)). The third horoscope on the Brugsch's zodiac is the Horoscope without Walking Sticks (see Figure 2.15). On this horoscope the situation with Saturn is more complicated, therefore, on Figure 5.28 (BR) there is a question mark placed under the presumed figure of Saturn. As a matter of fact, it is unclear which of the four figures standing together in this horoscope symbolizes Saturn: the man, monkey, jackal or falcon (see Figure 5.31).

Figure 5.31: *Fragment of the Brugsch's zodiac containing the Horoscope without Walking Sticks.*

The situation here is rather complicated. However, we are quite lucky here, because all the four figures are male and located together, which indicates that Saturn, Jupiter, Mercury and Mars are shown here together. As Venus is never symbolized by a male figure and the Sun and Moon usually on the Egyptian zodiacs are not shown as humans, the other three planets couldn't be represented by these figures. So, from the point of view of the astronomical dating it is not so important to know exactly which one among these four figures is Saturn. Nevertheless, at the end of astronomical computations we were able to determine the correct order of these planes and obtained that the figure with jackal head is Saturn. We will discuss these computations and the results in Chapter 8.

The fact that the Horoscope without Walking Sticks escaped the attention of the previous researchers wasn't without a reason. The four symbols representing the "male" planets on this horoscope were very common in the Egyptian mum-

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Figure 5.32: *Four Canopic jars.* (Taken from [116], p. 115)

mification process. On Figure 5.32 we show the four so-called Canopic jars decorated with heads of a man, baboon, falcon and jackal. This type of jars were always found near the coffins inside the Egyptian graves[12].

Egyptologists explain the presence of Canopic jars as follows:

Near the coffins in the graves there are always other containers to be found, mostly wooden boxes, in which four vessels were kept, ... The Egyptians called them Canopic jars ... They were used to hold the internal organs taken from the body and, because the body was incomplete without them, these were always placed together. ... The precious internal organs were entrusted to divine protection, to the four sons of Horus, whose heads usually adorn the stoppers of the Canopic vessels. The human-headed Amset, ... Hapi, with the head of a baboon, ... Duamutef looks like a dog ... and Qebehsenuf, with the head of a falcon, ... "[13]

It is not surprising that previous investigators of Brugsch's zodiac, including H. Brugsch himself, associated these four figures with the mummification ritual only and did not realize that they could actually represent planetary symbols. There is no contradiction in the double role of these figures. In fact, some researchers claim that the souls of the pharaohs were believed to become stars after their deaths, which quite well agree with some old Byzantine chronicles, according to which, the names of the first kings of Assyria and Egypt were simply the names of planets[14]. We should also mention that modern Egyptologists, following the opinion of Parker and Neugebauer, are convinced that this ancient Egyptian believe is related not to the planets but to the stars of the Orion constellation[15]. However, as we will show it in this book, this is a mistake resulting from the misunderstanding of the Egyptian symbol of the summer solstice, represented by a figure of a man with a raised hand (see Figures 4.4 and 4.5), as a symbol of the Orion constellation[16].

5.4.3 Seth, Anubis and Thoth as Egyptian Symbols of Saturn and Mercury

The identification of Saturn with the jackal-headed figure turns out to correspond well with the ancient Egyptian mythology. It is accepted that the jackal-headed figure on ancient Egyptian drawings represents the god Anubis[17] (see Figure 5.33), which is, according to the *Pyramid Texts*, the main god of the dead[18]. On the other hand, Saturn was also considered to be a god of the dead[19], what was also stressed on the medieval representations of Saturn by the presence of a scythe as its attribute (see for example Figure 5.30). Moreover, it is believed that Anubis was sometimes identified with the Greek god Hermes, who was the conductor of the dead to Hades. But Hermes was often identified with the Roman Mercury[20]. Therefore, Anubis on Egyptian zodiacs could symbolize Saturn as well as Mercury, and these two possibilities should always be considered. It follows from our calculations that indeed the jackal head on Egyptian zodiacs usually represents Saturn but sometimes it may also represent Mercury. For example, on the Big Esna zodiac, it is Mercury symbolized by a figure with a jackal head. It is possible that on the Color Thebes zodiac (OU), Mercury also has a jackal head, while Saturn has an ibis head. Since, in the astronomical solution obtained for this zodiac Saturn and Mercury were very close one to another, the other combination can not be dismissed (see Figure 5.28 (OU)).

N.A. Morozov believed that Egyptian god Anubis was a symbol of Saturn[21].

It is clearly a situation where two possible meanings could be associated with the same jackal-headed figure, so Saturn and Mercury could be confused. There is some explanation for it. If we look at Figure 5.33, we notice that there is another god called Seth, with almost identical appearance as Anubis. Although the head of Seth is described by Egyptologists as an imaginary (composite) animal's head, it is difficult not to see striking similarities to the head of Anubis. In our opinion these two figures have jackal heads. Seth is considered to be

[12] See for example [116], p.114, or [112], p. 143.
[13] See [112], p. 154.
[14] See [25], p. 195, [33], p. 40, [34], p. 8.
[15] [36], p. 96.
[16] See [35], Vol. 1, pp. 24-25.
[17] See [118], p. 19.
[18] See [26], p. 49.
[19] See [26], p. 488.
[20] See [26], pp. 50, 151.
[21] See [4], Vol. 6, pp. 653, 658, 678.

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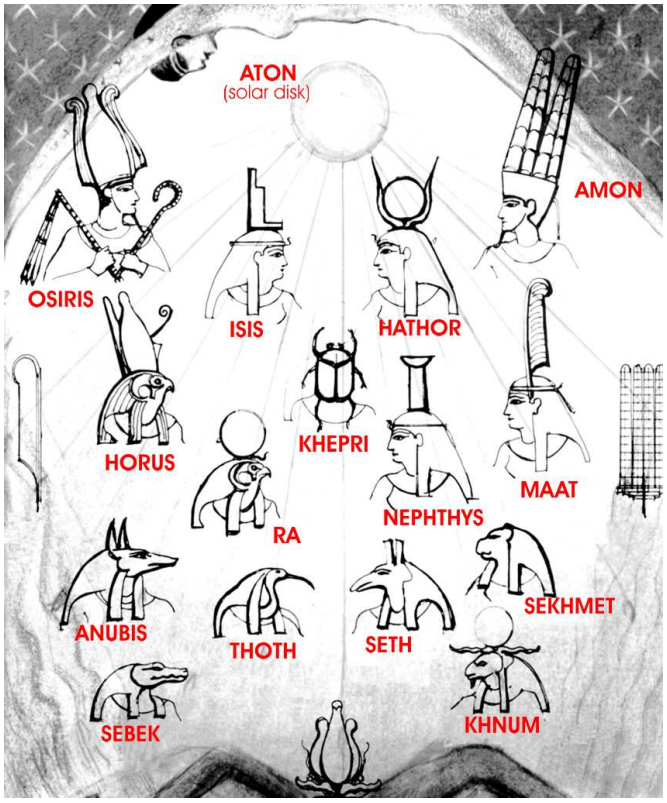

Figure 5.33: *Egyptian "gods" — representations of planets on Egyptian zodiacs.* (Taken from [9], p. 15)

the god of destruction, or in other words, the embodiment of the necessary and creative element of violence and disorder within the ordered world. This description and the name Seth match well the character of Saturn.

Therefore, jackal's head had a dual meaning on Egyptian zodiacs. It could represent Saturn or Mercury. But, there is another symbol to which we can assign the same dual meaning. It is the head of ibis. The sacred ibis (*Threskiornis aethiopica*), of southern Arabia and Africa south of the Sahara, was a bird worshiped by ancient Egyptians. On Figure 5.34 we show a photo of ibis.

The ancient Egyptian god with head of ibis is called Thoth (see Figure 5.33 and 5.23). It is believed that the Greeks identified Thoth with their god Hermes:

The Greeks had adopted the Egyptian god Thoth into their pantheon under the name of Hermes. According to Clemens Alexandrinus, Thoth wrote forty two books, . . . only very small parts of these works remain in the writings of Stobaeus and others of that time. These . . . have been claimed by some authorities as post-Christian, because of their similarity to the works of Neo-platonic writers.[22]

Figure 5.34: *A photo of ibis.*

Figure 5.35: *Egyptian "gods" Anubis and Thoth.* (Taken from [112], p. 137)

As we've already explained, Hermes was identified by Romans with Mercury. We will see that on Egyptian zodiacs Thoth sometimes symbolized Saturn. For example, Saturn on the Small Esna zodiac is shown as a procession of three male figures, one of them with the ibis head (see Figure 5.28 (EM)). As we already mentioned, probably Saturn has also the ibis head on the Color Thebes zodiac, but this figure also symbolize Mercury. Some researchers believe that Thoth and Seth were the names of the same ancient Egyptian "god"[23]

[22] See [118], p. 67.

[23] See [39] or [37], II, pp. 78-80.

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This duality involving Saturn and Mercury certainly should sometimes cause confusion in old astronomical symbolism. It was already noticed by N.A. Morozov, who wrote:

Egyptologists refer to Seth as the oldest son of Osiris — a murderer of his father. He is the King of Darkness. Astrologically . . . he is symbolized by Mercury, . . . who always hides behind the Sun to ambush his father Moon — Osiris, when he approaches the Sun . . . Later, when the evil connotations were transferred on Saturn, Seth became mixed up with Saturn." [24]

5.4.4 Jupiter in the Main Horoscope

On Figure 5.37, we show the representations of Jupiter in the main horoscope on different Egyptian zodiacs. We use the same convention as in the case of Saturn, namely, we mark with shaded labels those zodiacs where it was not possible to identify the symbol of Jupiter during the first stage (prior to calculations) and the identification was obtained only after the calculations. For the same reason as for Saturn, on Figure 5.37 the symbols representing Jupiter on the Petosiris zodiacs, as they are of different type, are not included. We will discuss them later in this chapter.

Let us remind that there are three main horoscopes on Brugsch's zodiac, so there are also three representations of Jupiter indicated for the zodiac (BR) of Figure 5.37.

First, let us discuss the representation of Jupiter on the Denderah zodiacs. Above the figure of Jupiter, on the both zodiacs, there is exactly the same hieroglyphic inscription (see Figure 5.37 (DR) and (DL). These hieroglyphs include a bird and horns. Henry Brugsch, based on this inscription, which reads *Hor-apis-seta*, identified this figure as Jupiter[25]. N.A. Morozov had no objection to this identification[26]

In the works written by contemporary Egyptologists we can also see the same identification of Jupiter on the Denderah zodiacs[27]. That means that all the researchers accepted on the Denderah zodiacs the figures indicated by Brugsch as Jupiter. We also accept Brugsch's choice as a symbol of Jupiter. Let us add that modern Egyptologist S. Cauville translates the hieroglyphic inscription above Jupiter's head differently. In fact she suggested two variants: *"Horus qui eclaire le pays"* (in French) or *"Horus qui devile le mystere"* (in French), what simply means *"Horus who enlightens the country"* and *"Horus who reveals the mystery"*, but still she confirmed these symbols as Jupiter. This identification of Jupiter was finally confirmed by the results of our computations, which led to the complete and unique solutions for all the studied zodiacs.

We've already explained in the previous section that on Brugsch's zodiac the name of Jupiter in the Demotic Horoscope was inscribed together with the name of Saturn near Leo's head. This Demotic inscription was translated by H. Brugsch and we trust his accuracy. Brugsch was a prominent expert in the Demotic writing and an author of the well-known Demotic grammar[28]. We should add, that by following Brugsch's translation we have arrived to a meaningful solution, which is well consistent with the solutions of the two other horoscopes on this zodiac. Based on our computations we can reconfirm the correctness of Brugsch's identification, otherwise it would be highly improbable that faulty data could result in coinciding solutions.

In the Horoscope without Walking Sticks, Jupiter is shown in a group of four "male" planets placed together (see Figure 5.31) and our computations indicated that it has to be the figure with baboon's head (see Figure 5.37 (BR)). In the Horoscope in Boats, Jupiter can be recognized by elimination process (see Chapter 8 for more details).

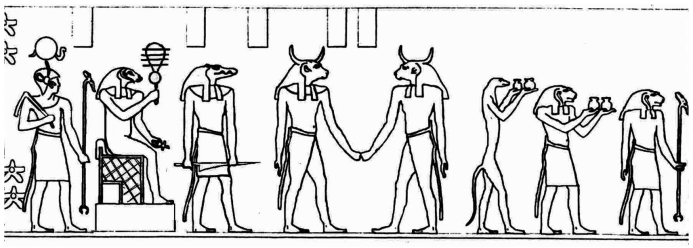

Figure 5.36: *The fragment of the Big Esna zodiac showing the Jupiter procession broken by the spring equinox sign.*

On the Athribis zodiacs, Jupiter is represented by a bird with snake-like tail and head. This detail can be clearly distinguished on the Lower Athribis zodiac (see Figure 5.36 (AN)), but on the Upper Athribis zodiac it is damaged (see Figures 3.13 and 5.37 (AN) and (AB)). This identification of Jupiter on the Athribis zodiacs agrees with Flinders Petrie's explanation that snaky birds must symbolize Jupiter. According to the ancient mythology, Jupiter was throwing, from the heaven at the Earth, the lightnings that were shaped like snakes. We didn't use the Flinders Petrie idea, however, we obtained the same identification as a result of our computations.

We would like to point out that on Figure 5.37 (EB) the symbol of the spring equinox, which is placed right in the middle of the Jupiter procession, is shown in a smaller size. By doing so we wanted to emphasize only the symbols directly related to Jupiter. The original (undistorted) look of this fragment of the Big Esna zodiac is shown on Figure 5.36.

5.4.5 Mars in the Main Horoscope

On Figure 5.38, we show the representations of Mars in the main horoscope on different Egyptian zodiacs. Again we use the same convention — we mark with shaded labels the zodiacs, for which it was not possible to identify the symbol

[24] See [4], Vol. 6, p.787.
[25] See [4], Vol. 6, p. 652.
[26] See [4], Vol. 6, p. 652.
[27] See [10], p. 31.
[28] See [118], p. 47.

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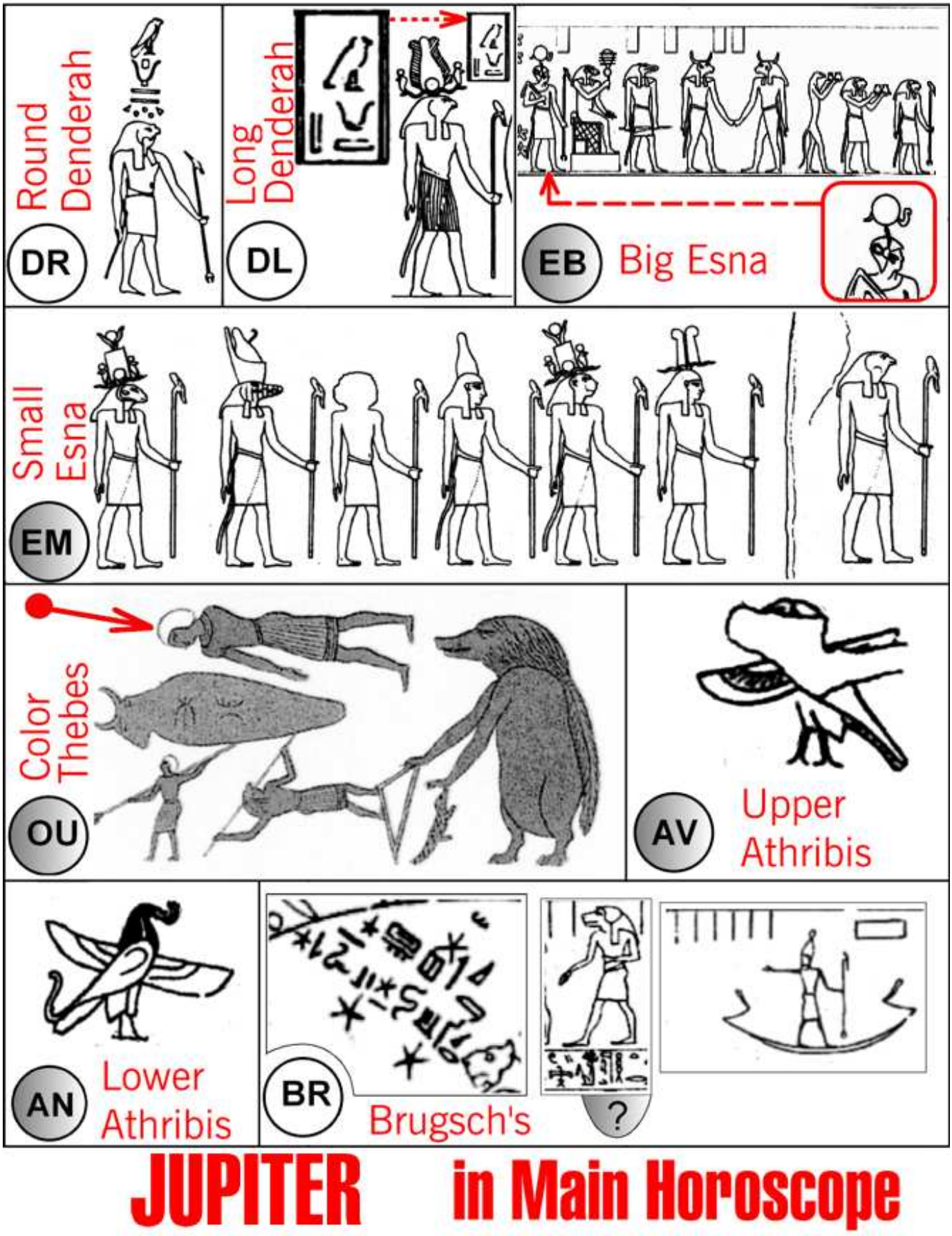

Figure 5.37: *Representations of Jupiter in the main horoscope on different Egyptian zodiacs*

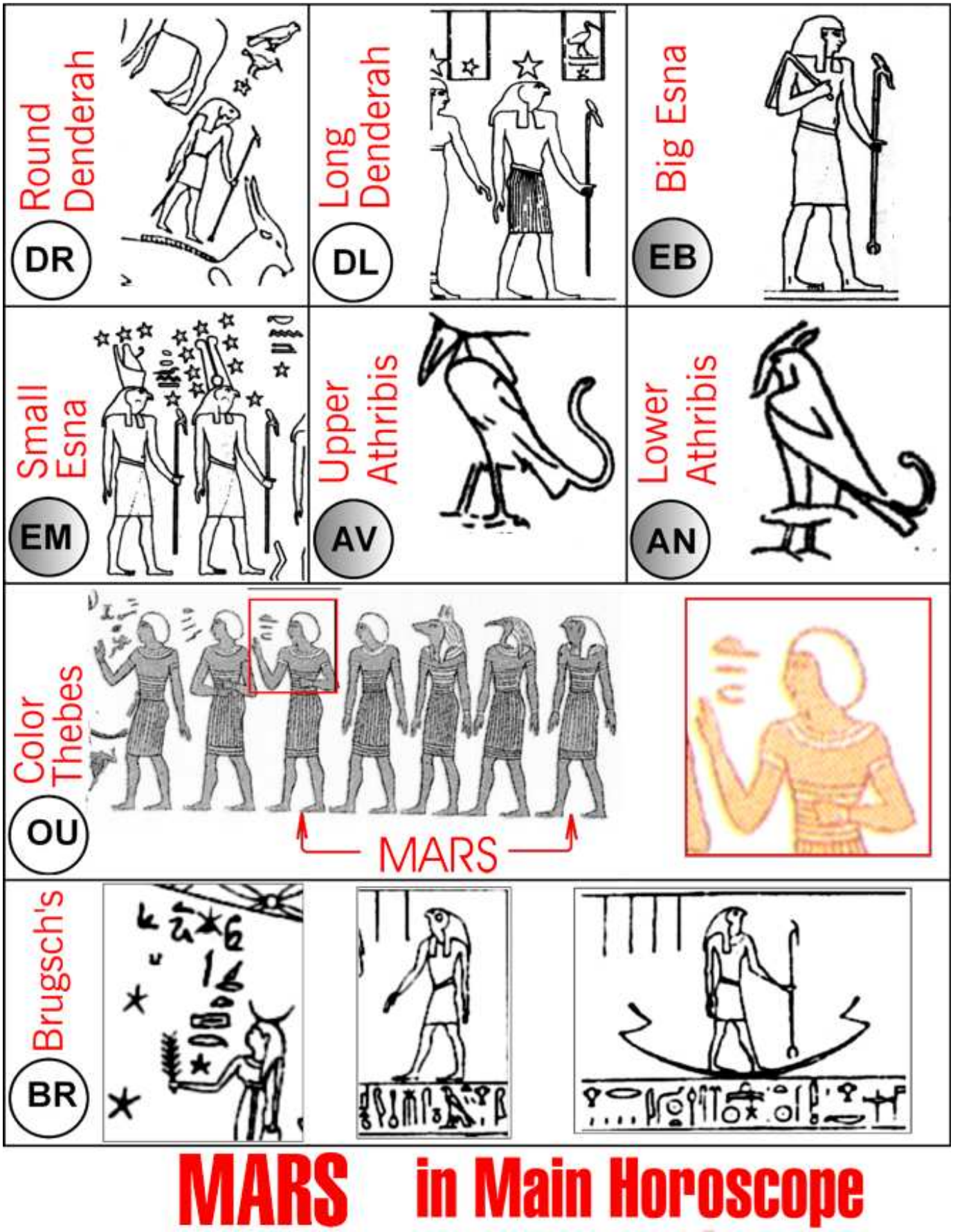

Figure 5.38: *Representations of Mars in the main horoscope on different Egyptian zodiacs*

of Mars during the first stage, and the identification was obtained only after the computations were completed. On Figure 5.38 we skipped the symbols representing Mars on the Petosiris zodiacs. They are of different type and we will discuss them later in this chapter.

For Brugsch's zodiac, there are three representations of Mars shown of Figure 5.38 (BR). In the Demotic Horoscope, Mars is indicated by an inscription, which was translated by H. Brugsch as *"Hor-Teser"*, which according to him means Mars[29].

Figure 5.39: *The fragment of the Round Denderah zodiac showing the symbol of Mars (a falcon-headed figure) with a hieroglyphic inscription above its head.*

On the majority of the other horoscopes, except the Big Esna and the Athribis zodiacs, Mars is shown as a male figure with a falcon head. On the Big Esna zodiac, there is no figure with a falcon head present at all. The identification of Mars with a falcon-headed male figure was first suggested by Henry Brugsch in the case of the Denderah zodiacs. H. Brugsch translated a hieroglyphic inscription placed near the head of this figure (see Figure 5.38 (DL)) as *"Hor-Tos"*, which means *"Red Planet"*[30]. Let us point out that only Mars is called the Red Planet because of its reddish appearance. This identification of Mars on the Long Denderah zodiac was adopted by Morozov and all other investigators of the Denderah zodiacs. On the Round Denderah zodiac, there is also the same figure of Mars (see Figures 5.38 (DR) and 5.39) placed over Capricorn with a hieroglyphic inscription near its head. This inscription, according to the translation of modern Egyptologist S. Cauville, means *"Red Planet"*, i.e. Mars[31].

We also used the same identifications of Mars on the Denderah zodiacs, as well as on the Color Thebes (OU) and Brugsch's zodiacs (BR), where there was only one planet with such an appearance. However, on the Big Esna zodiac, there is no falcon-headed figure and on the Small Esna zodiacs there are many such figures present. We used our calculations to determine the exact location of Mars on each of two Esna zodiacs (see Chapter 7 for details). It is remarkable that on the Small Esna zodiac the falcon-headed figures appear in few planetary procession, but there is only one procession composed entirely of falcon-headed figures, and exactly this procession turned out to symbolize Mars.

5.4.6 Venus in the Main Horoscope

On Figure 5.41, we show the representation of Venus on the Egyptian zodiacs. As before, Venus on the Petosiris zodiacs is not shown on Figure 5.41, and this case will be discussed later.

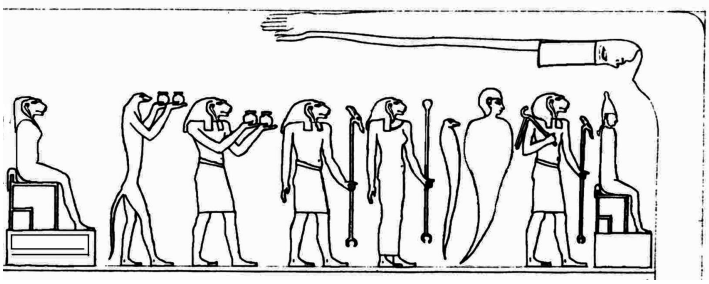

Figure 5.40: *The fragment of the Big Esna zodiac showing figures of Venus and Mars.*

Concerning Brugsch's zodiac, there are three different representations of Venus shown on Figure 5.41 (BR). An inscription in the Demotic Horoscope, which was translated by H. Brugsch, clearly identifies Venus. N.A. Morozov, who adopted Brugsch's identification of all planets in this horoscope, writes the following: *"In between Scorpio and Sagittarius, there is a Demotic inscription bending towards Sagittarius' head, which reads "Pe-Neter-Tau" (i.e. Morning Planet) — Venus."*[32] On the other horoscopes in the Brugsch's zodiac, Venus is shown by figures. In the case of the Horoscope in Boats, Venus is easy to recognize as the only female figure on a boat. But, in the Horoscope without Walking Sticks, the representation

[29] See [4], Vol. 6, p.697.
[30] See [4], Vol. 6, p. 652.
[31] See [10], p. 30.
[32] See [4], V. 6, p.697.

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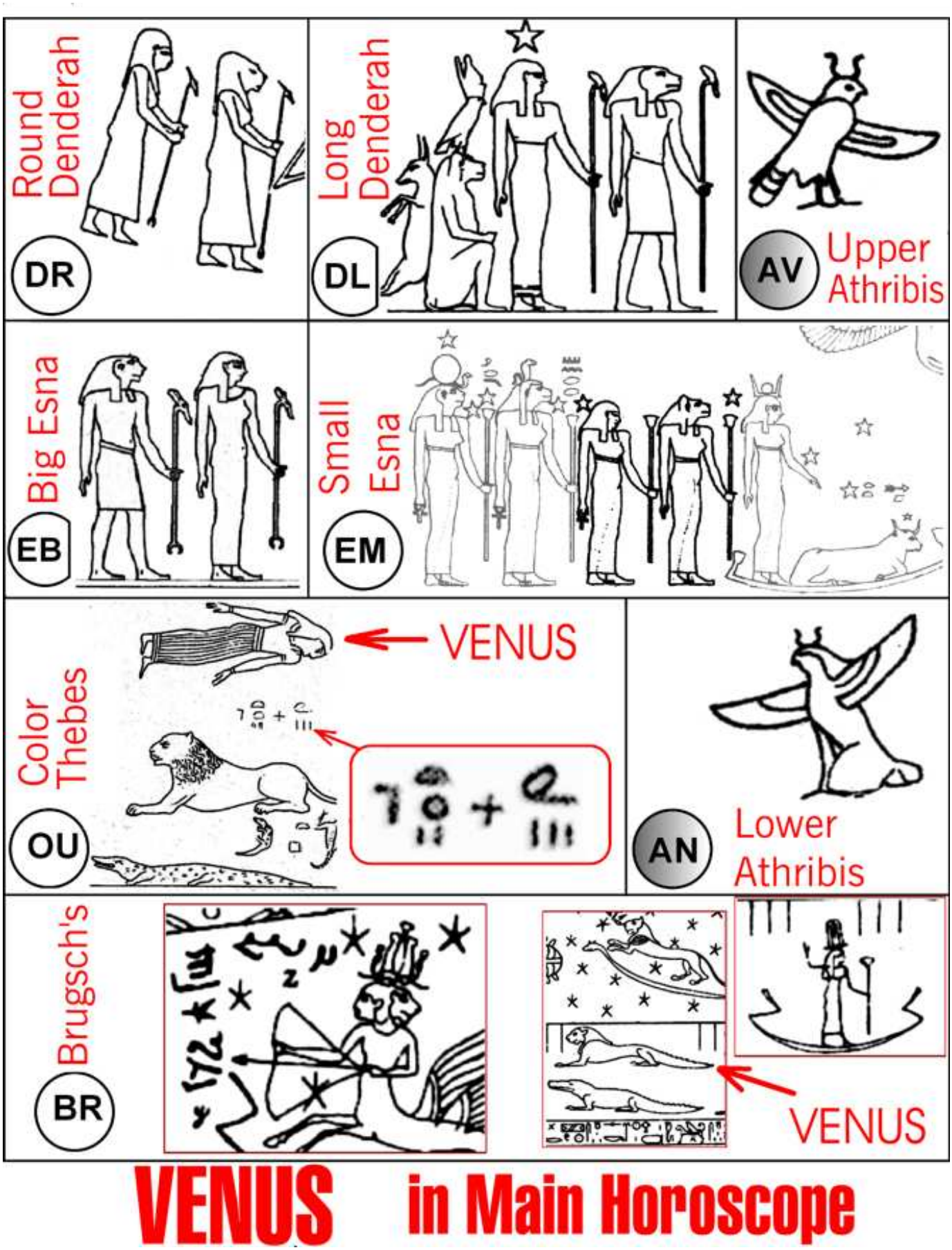

Figure 5.41: *Representations of Venus in the main horoscope on different Egyptian zodiacs.*

of Venus, as a lioness, is more complicated, but still agrees with the convention used in the Egyptian symbolism. We will discuss this symbol in more details later in this section.

On Figure 5.40, we show a fragment of the Big Esna zodiac with Venus represented by two figures with walking sticks — a female accompanied by a lion-headed male. On the right side of the same picture, we can also see Mars holding a walking stick and a whip.

Venus, as the only "female planet" (except Moon), which is practically always represented by a human female figure, and therefore, it is the simplest planet to identify on the Egyptian zodiacs. Notice that Moon, which was also considered by the old astronomy to be a female[33], is always represented (or at least accompanied) by a symbol of a crescent or a disc, so it is impossible to confuse these two planets. Consequently, in order to identify Venus, it is sufficient to find on a zodiac a female planetary figure. Let us point out that on the all known to us Egyptian zodiacs, except the Athribis zodiacs, Venus can be immediately recognized as the only female planet. Our calculations confirmed the correctness of this approach — for all the considered zodiacs we obtained complete and unique meaningful solutions.

Nevertheless, the famous Egyptologist Henry Brugsch made a mistake in identifying Venus on the Denderah zodiacs. Surprisingly, this mistake is persistently reproduced by other Egyptologists and dragged from one book to another[34], and all these in spite the fact that N.A. Morozov, already in the first half of the 20th century, found this error, corrected it, and even explain the reasons why Brugsch made it. Let us present this matter in detail.

Figure 5.42: *The fragment of the Round Denderah zodiac showing figures of Venus and Mercury*

When in the 19th century Henry Brugsch was decoding the astronomical content of the Round Denderah zodiac and tried to find Venus on it, for some reason, he disregarded two female figures with planetary walking sticks (see Figures 5.41 (DR) or 5.42). Possibly, the reason for it was the absence of an inscription near the heads of these two figures. H. Brugsch, in his attempt of decoding of the planetary symbols, was guided by the meaning of hieroglyphic inscriptions without putting too much attention to the analysis of the Egyptian symbols. Indeed, near the two female planetary symbols there are no hieroglyphs, contrary to the other planetary symbols. But anyway, this is the only one occurrence of female planetary symbols on the whole Round zodiac. Instead, Brugsch suggested that Venus is represented by a male(?) planetary figure with a double face. On the Round zodiac this figure is located between Pisces and Aquarius, and on the Long zodiac between Aries and Taurus (see Figures 5.42 and 5.43).

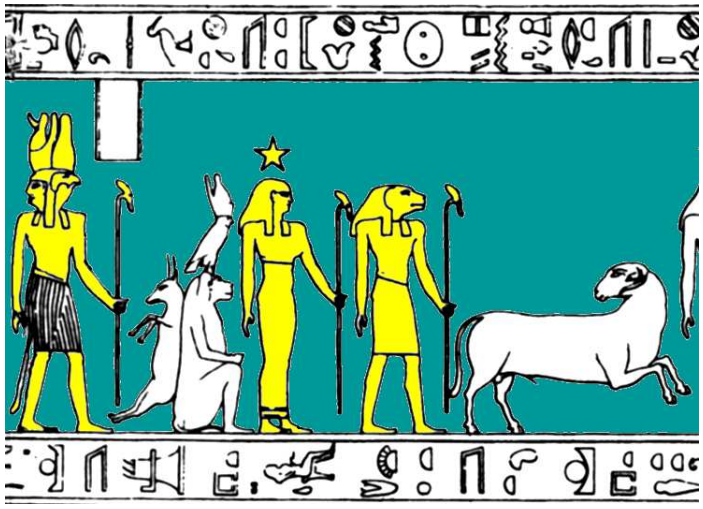

Figure 5.43: *The fragment of the Long Denderah zodiac showing figures of Venus and Mercury.*

Henry Brugsch, in his investigation, found on the Long zodiac near the double-faced figure a hieroglyphic inscription, which he read as *"Pnouter-Ti"* and translated as *"God/Goddess of the Morning"*[35]. He interpreted this inscription as the name of Venus but he didn't realize that from the astronomical point of view it could also be Mercury. N.A. Morozov, while checking the Brugsch's identification found this mistake. Let us explain why the inscription *"God/Goddess of the Morning"* could also refer to Mercury as well as to Venus. It is known that in ancient Egypt Mercury and Venus were both called "morning star"[36]. They are inferior planets – those with orbits smaller than the Earth orbit and that is why for an observer on the Earth they can only be visible in the evenings or mornings, when the Sun is not too deep under the horizon. But Mercury is even closer to the Sun than Venus, in fact it is never more than $27^o45'$ of angle away from the Sun and thus it is seen only as a "morning" star just before sunrise or an "evening" star just after sunset. The angular

[33] See [26], p. 121.
[34] See for example [10], p. 30.
[35] See [4], Vol. 6, p. 653.
[36] See [120], page 117.

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distance of Venus from the Sun is less or equal to 48^o, so it can be seen also in the beginning and the end of a night. In fact, the name *"God of the Morning"* fits better Mercury than Venus. Moreover, there are other more appropriate planetary symbols for Venus on the both Denderah zodiacs. Namely, as we've already explained, on the Round zodiac there is a pair of two females with walking sticks (one of them with a lion head) and on the Long zodiac there is a female with a walking stick escorted by a lion-headed male figure also with a walking stick.

Let us notice that on an Egyptian zodiac Venus is usually is represented by a couple of planetary figures, one of which is a female and another either a female or a male. On the other hand, all the "male planets" on the Egyptian zodiacs, i.e. Saturn, Jupiter, Mars, Mercury and sometimes the Sun (when it is shown by a human figure), are always males.

This double appearance of the inferior planets on the Egyptian horoscopes, i.e. a two-faced Mercury and a two-figure Venus, can be explained from the astronomical point of view. The appearances of each of these two inferior planets alternate among mornings and evenings only. These morning and evening appearances are separated by periods of invisibility, which in the beginning of the ancient astronomy was considered as a physical disappearance of the planet. The reappearance of the planet was seen as the birth of a new — morning or evening planet. After some time it was realized that the same planet was observed in the mornings and the evenings, which was simply invisible in between. For example, in ancient Greece Mercury was called Apollo when it appeared as a morning star and Hermes, when it appeared as an evening star. This old belief left its traces in the ancient Egyptian astronomical symbolism in a form of the double representation of these planets. However, N.A. Morozov pointed out that the creators of the Egyptian zodiacs had already a clear understanding of the true nature of the morning/evening planets, which means that these zodiacs could not belong to the epoch of the early astronomy.

A question arises: after identifying Venus with the figure of Mercury, how Egyptologists explain the presence of the female planetary symbol in a different part of the zodiac? Simply, they have no other option left, and this definitely creates a big problem for them. They have no idea what to do with these female planetary symbol. For example, French Egyptologist S. Cauville, in her detailed study of the astronomical symbolism of the Round Denderah zodiac completely ignores this female pair (see Figure 5.42) representing Venus[37]. Nevertheless, she provides some explanation for the all other figures in the proximity of the zodiacal belt on the Round zodiac and conveniently overlooks the correct Venus representation! This refusal to acknowledge the presence of the correct Venus symbol on the Round Denderah zodiac suggests that Egyptologists realize some flaws in Brugsch's identification of Venus with the male two-faced figure. However, what is troubling them to correct the Brugsch's mistake? Maybe, correcting mistakes made by prominent and famous classical scholars is simply considered in Egyptology as a blasphemy?

Let us mention that Sylvie Cauville, when discussing in [10] the figure of Mercury on the Round zodiac, which she calls Venus, translates the hieroglyphic inscription above the Mercury's head as *"le dieu du matin"*, which in French means *"the god of the morning*. Let us point out that the noun *"le dieu - the god"* is of masculine gender, so again it confirms the male nature of this figure, which is of course clear from its appearance. We would like to point out that the Egyptian hieroglyphs indicate clearly the gender[38], and Cauville's translations demonstrate that this inscription is related to a male figure.

We should admit that in some cases Egyptologists correctly identify Venus and Mercury on the Egyptian zodiacs, i.e. by choosing the female planetary figure as Venus and the two-faced male figure as Mercury. However, this routine is applied only to the zodiacs that were not previously analyzed by such great authorities in Egyptology as for example the renowned H. Brugsch, and consequently there is no danger of creating contradictions with those opinions. For example, the contemporary specialists in the old Egyptian astronomical texts, the well-known Egyptologists O. Neugebauer, R.A. Parker and D. Pingree suggest in [5] such a decoding of the Petosiris zodiacs, where Venus is represented by a female bust and Mercury by a two-faced male bust, and this is a correct identification. We should say that on the Petosiris zodiacs all the planets, except the Sun, are shown in a form of busts (see Figure 5.44). For example on the Inner Petosiris zodiac there are two female busts, but one of them sits on a crescent indicating Moon, and the second one, by exclusion must represent Venus. On the same zodiac, Mercury is shown by its standard representation — two-faced male figure (see Figure 5.44). By making this identification the authors of [5], practically make correction of Brugsch's mistake. If they were following Brugsch's idea, they should recognize the two-faced male figure as Venus and, in the same time, identify a male planet with one of the female figures. On this zodiac the number of busts is equal to the number of planets, so each bust has to represent a planet. As there is no partial horoscope here. Since there is no room for any manipulation with the planetary figures, Brugsch's mistake becomes obvious.

On the Color Thebes zodiac (OU) there is only one variant possible for Venus. Venus is represented by the only female figure located in the horoscope area on this zodiac (see Figures 5.42 (OU) and 2.3). Let us notice that on this zodiac there are no figures with walking sticks present and the planets are indicated by figures accompanied by inscriptions. On Figure 5.42 (OU), we show the magnified inscription corresponding to Venus.

We've already discussed the inscription indicating Venus in the Demotic Horoscope on the Brugsch's zodiac. Since on this horoscope all the planets are marked by Demotic inscrip-

[37] See [10].

[38] See [9], p. 119.

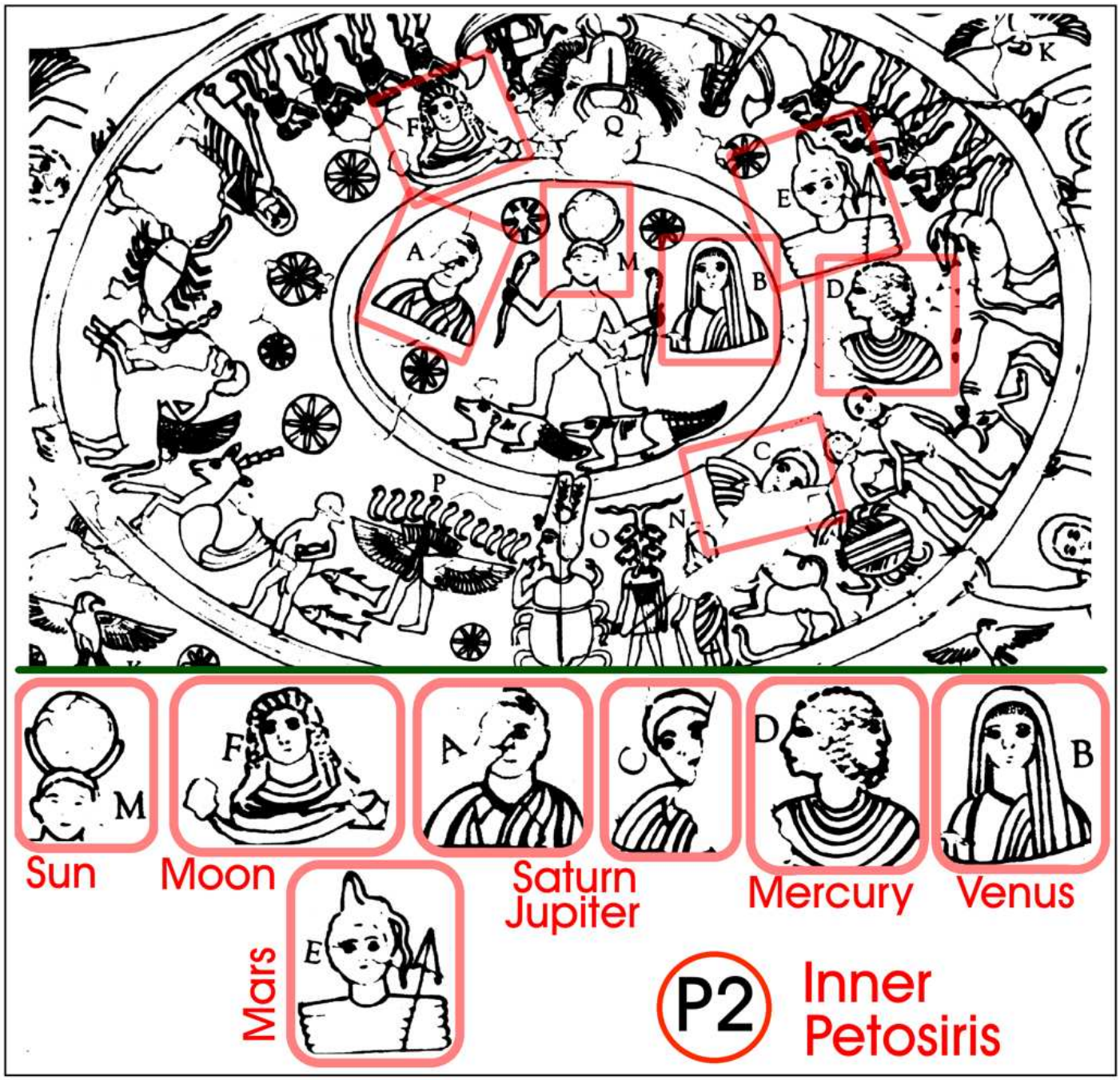

Figure 5.44: *Planets on the Inner Petosiris zodiac.*

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Figure 5.45: *Photographs of two stone statues representing the "goddess" Sekhmet.* (The photo the left was taken from [119], p. 36, and the photo on the right was taken by the authors in the Hermitage Museum in St. Petersburg, Russia)

tions, we relay on Brugsch's translation. In the Horoscope in Boats, Venus is easily recognized as the only one female figure among all the other figures with walking sticks standing in boats (see Figure 2.15). Notice that this figure has a long dress and its step-size is noticeably smaller than the step-size of the other figures. On the Horoscope without Walking Sticks, the representation of Venus is unusual. It was first determined by identifying all the other planets, so there was only one symbol left for Venus. This symbol appears to be the lioness and the crocodile under it (See 5.42 (BR)). It is interesting to compare it with the Venus representation on the Color Thebes zodiac (OU). On the both zodiacs Venus is shown in Leo. Notice that on the Color Thebes zodiac besides of the female figure symbolizing Venus, there is exactly the same combination, as on Brugsch's zodiac, of a lion and a crocodile under it. Consequently, there is a strong indication that such a combination of symbols should be associated with Venus in Leo.

Let us emphasize that a representation of Venus on the Egyptian zodiacs is very often endowed with lioness attributes. This appearance is common in the main horoscopes, but it is even more common in the symbolism of the partial horoscopes, what will be discussed later. For example, on the both Denderah zodiacs and the both Esna zodiacs one of the two figures representing Venus has a lioness' head, which can be seen more clearly on Figure 5.28, where the "goddess" Sekhmet has exactly the same appearance. The fact that Sekhmet or Sekhet is represented with a lioness' head is well known to Egyptologists[39]. On Figure 5.45 we show two Egyptian stone statues of Sekhmet, where it is easy to see that it indeed has a lioness' head.

[39] See [118], p. 156.

5.4.7 Mercury in the Main Horoscope

On Figure 5.46, we show the representations of Mercury in the main horoscope on different Egyptian zodiacs. The representation of Mercury on the Inner Petosiris zodiac (P2) is given on Figure 5.47. Unfortunately, Mercury on the Outer Petosiris zodiac was badly damaged (see Chapter 8). As before, there are three different representations of Mercury shown on Figure 5.46 (BR), which correspond to three main horoscopes on Brugsch's zodiac. In the Demotic Horoscope on this zodiac, Mercury's name was inscribed in demotic between Scorpio and Libra (see Figure 5.46 (BR)). Henry Brugsch deciphered it as *"Sebek"* and translated it as *Mercury*.

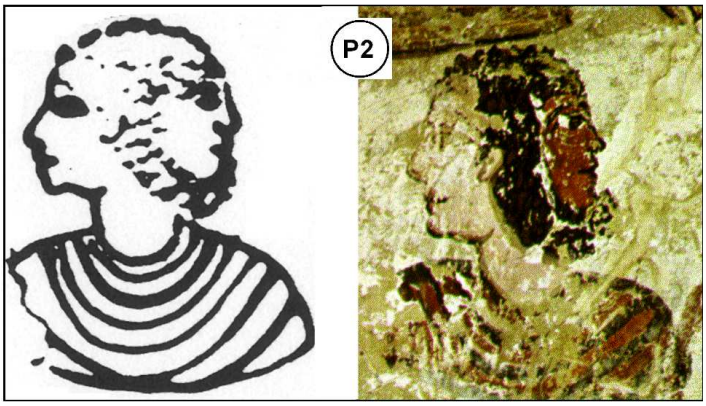

Figure 5.47: *Representation of Mercury on the Inner Petosiris zodiac.*

As we already explained it earlier, Mercury was often represented in a form of a male figure with a double face. This is the case of the Denderah, Athribis and Petosiris zodiacs (see Figures 5.46 and 5.47). However, on some Egyptian zodiacs there is no two-faced planetary symbol at all, and Mercury in such cases is represented by a male figure with one face. Usually it is a human face, but sometimes it could be a face of a animal, for example a jackal face. We already mentioned that some planetary figures with jackal's or ibis' head can symbolize Saturn as well as Mercury, so these two possibilities should always be considered. On the Color Thebes zodiac (OU), Mercury and Saturn are shown by two figures standing together, one with jackal's and another one with ibis' heads. In this situation we are not able to definitely determine which one of these figures represents Mercury, so on Figure 5.46 (OU) we marked with a solid arrow the most probable variant for Mercury (a figure with a jackal head) and also another variant with a dashed arrow annotated with a question mark.

In our investigation we have adopted a principle that **if on a zodiac there is a double-faced male planetary figure, it is Mercury** (see the discussion in subsection 5.4.6).

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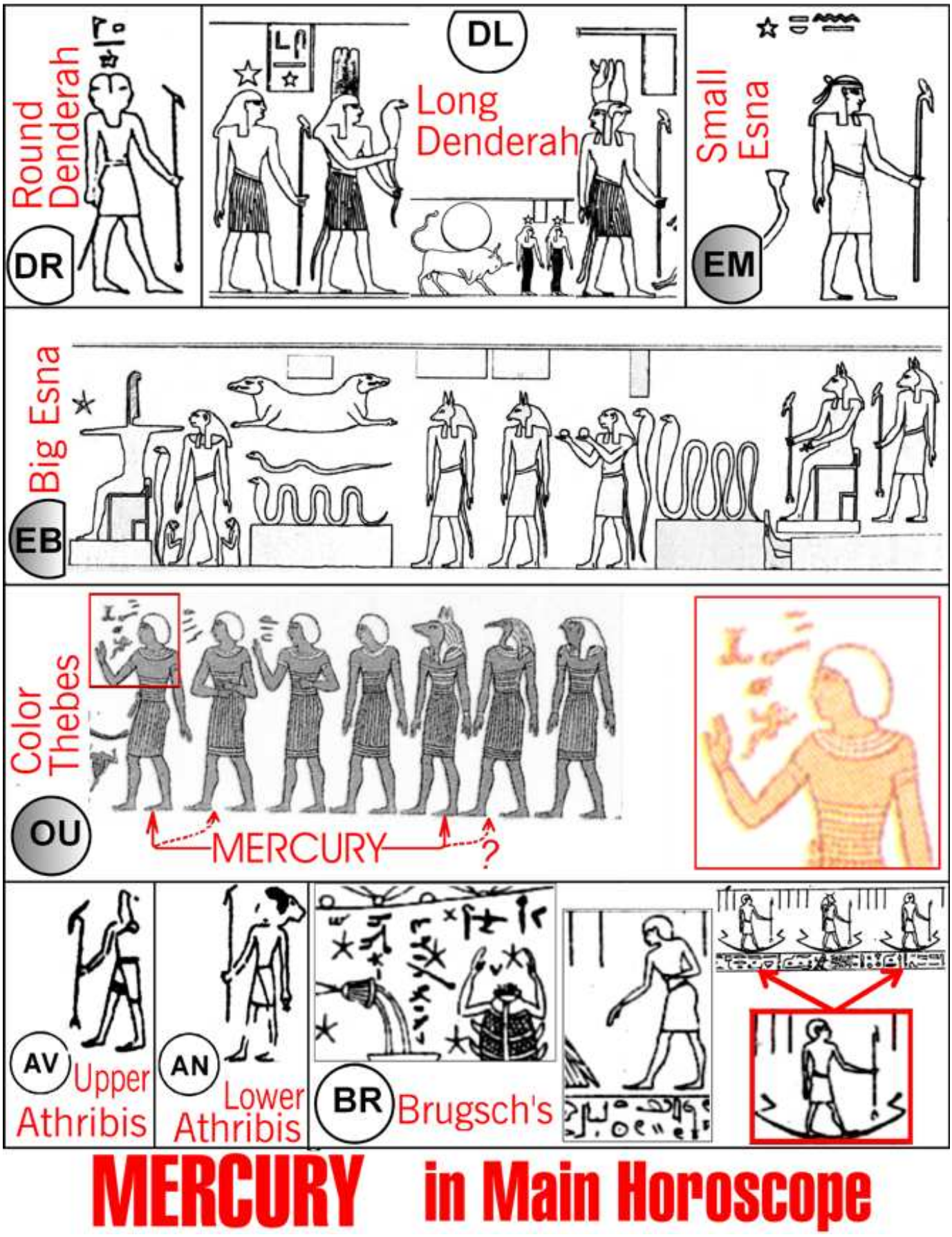

Figure 5.46: *Representations of Mercury in the main horoscope on different Egyptian zodiacs (some symbols not related to Mercury were intentionally shrank).*

5.4.8 Additional Symbols associated with Mercury on Egyptian Zodiacs

During the process of our research, it became clear that Mercury on various Egyptian zodiacs was often accompanied by additional symbols. In this subsection we will classify briefly these symbols, which turned out to be very useful in certain difficult situations to locate Mercury on a zodiac. These symbols are:

- *Creatures with double faces or with two heads. A pair of two identical animals looking in opposite directions or a figure pointing opposite directions with spread hands.* (See for example Figure 5.46 (EB)) Notice that on the Color Thebes zodiac (OU) among the hieroglyphs standing near the head of one of the figures, which is most probably representing Mercury, there is a small symbol of a person in a sitting position with arms spread in different directions (see Figure 5.46 (OU)). There is some resemblance between this figure and one of the sitting figures on the Big Esna zodiac (see Figure 5.46 (EB)).
- *A snake in a vertical position, sometimes held in a hand like a walking stick.* This symbol can also be sometimes associated with Venus. It is quite common in the partial horoscopes but can also appear in the main horoscopes. For example, notice two vertically placed snakes on the Big Esna zodiac in the Mercury procession (see Figure 5.46 (EB)). In certain cases, like in the partial horoscope of the summer solstice on the Big Esna zodiac, the snake can be two-headed (we will discuss this example in the subsection devoted to partial horoscopes). We would like to point out that snakes placed horizontally, even with two heads, can be found in many places on the Egyptian zodiacs and they are not connected to Mercury. Some types of such snakes denote the equinox points. Similarly, there is also a special type of a snake in a vertical position, "sitting" on its tail, which is neither related to Mercury, but denotes the solstice points. We will discuss these symbols later with more details.
- *A feather on the head of figure or replacing the head.* This symbol very often denotes Mercury, but there are also some exceptions. It is a common symbol for Mercury in the partial horoscopes, in particular for the summer solstice horoscopes. Notice that the figure with spread hands sitting in the Mercury procession on the Big Esna zodiac (see Figure 5.46 (EB)) has a feather instead of its head.

5.4.9 Representation of Mercury in two locations on one Horoscope

Mercury is moving on the sky much faster than all the other planets (except the Sun and Moon). In one or two days it can noticeably change its position on the ecliptic. We should mention that a typical horoscope shows a date with an accuracy from one to several days and sometimes even more than one week. We are not sure about the intentional accuracy of the dates encoded in the Egyptian zodiacs, but it is likely that it was up to several days. As in the old epochs the time was sometimes measured in weeks not in days, it is probable that the Egyptian zodiacs were intended to show the astronomical picture for the whole week when some important events related to this zodiac took place. If it was indeed the truth, then a horoscope was a perfectly sufficient tool to commemorate an important date with such accuracy. However, in order to keep up with the fast changing position of Mercury, which within one week could move from a visible to invisible position (or vice versa), sometimes it was necessary to record its multiple positions. This would explain the fact that on some Egyptian zodiacs Mercury appears in two positions simultaneously. For example on the Long Denderah zodiac, Mercury is shown in two close to each other positions, in one of which it was visible but in another it wasn't.

The fact that Mercury is shown on the Long Denderah zodiac two times, was already noticed by N.A. Morozov[40]. On Figure 5.46 (DL) we show a fragment of the Long Denderah zodiac with two symbols representing Mercury. On the left from Taurus, Mercury is shown in visible position represented by a couple of males — one of them with a walking stick and another one, with two feathers on its head (which are features of Mercury), is holding vertically a snake. The visibility of Mercury is indicated here by a star symbol over the head of the figure with a walking stick. On the right side from Taurus, Mercury is shown as a two-faced male with a walking stick. As there is no star over its head, it wasn't visible at that time. The symbols of visibility are not the same of different Egyptian zodiacs and we will discuss them in more detailed way later in this chapter. On the both Denderah zodiacs the visibility symbol, which was discovered by Morozov, is a star over the head.

Mercury has also two representations in the Horoscope in Boats on Brugsch's zodiac (see Figure 5.46 (BR)).

5.4.10 Relation between Mercury and the Roman god Janus

Let us make few remarks concerning the idea expressed by N.A. Morozov that Mercury corresponds to the two-faced Roman god Janus. This idea is supported by some facts from mythology. The Greek name of Mercury was Hermes[41] and this name is believed to be derived from *herma* — the Greek word for a heap of stones, which was used in the country to indicate boundaries or as a landmark.

Hermes was the swift messenger of the gods, and the name of this planet refers to its rapid motions relative to the other objects in the sky. Hermes was also the god of roads and **doorways**, and he was the protector of travelers. He was also called *Hermes Propylaeum*, what means *Hermes the Gatekeeper*.

On the other hand, in the Roman mythology, the gate god is Janus and his name was derived from *jani* (i.e., ceremonial

[40] See [4], Vol. 6, p. 654.
[41] See [26], p. 151.

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Figure 5.48: *The god Janus on a Roman coin.* (Taken from Encyclopedia Britannica)

gateways in Rome). Janus is the god of all the doorways and was represented by a double-faced head, with or without a beard (see Figure 5.48). Occasionally he was depicted as four-faced. Such four-faced symbols can also be found on Egyptian zodiacs in the partial horoscopes.

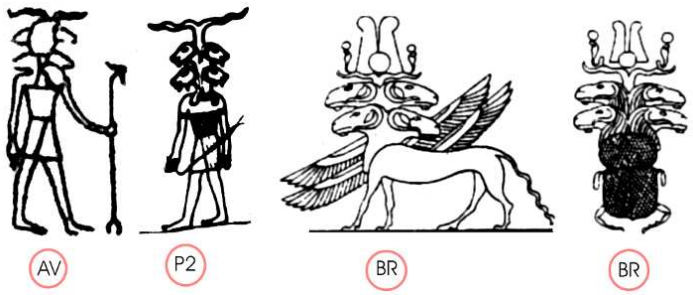

Figure 5.49: *Four-headed figures on Egyptian zodiacs.*

5.4.11 The Sun in the Main Horoscope

On Figure 5.51, we show the representations of the Sun in the main horoscope on different Egyptian zodiacs. It is not difficult to notice that the Sun in the most cases was shown as a circle. Sometimes, there was a narrow crescent marked on the circle near the edge, maybe in order to indicate that the crescent of new Moon always appears near the Sun. Indeed, usually we can only observe a part of the illuminated Moon's hemisphere. The whole hemisphere, i.e. the full moon, can only be seen when the Sun and Moon are positioned on the opposite sides of the Earth. On the other hand, if the Sun and Moon are positioned on the same side of the Earth and are close one to another, we can only see a small part (or even nothing) of the illuminated hemisphere of Moon. This is why Moon "dies" or is "reborn always "near the Sun, where it appears as a narrow crescent. This particular representation of the Sun can be seen on the zodiacs (DL), (EM) and (P2) (see Figure 5.51).

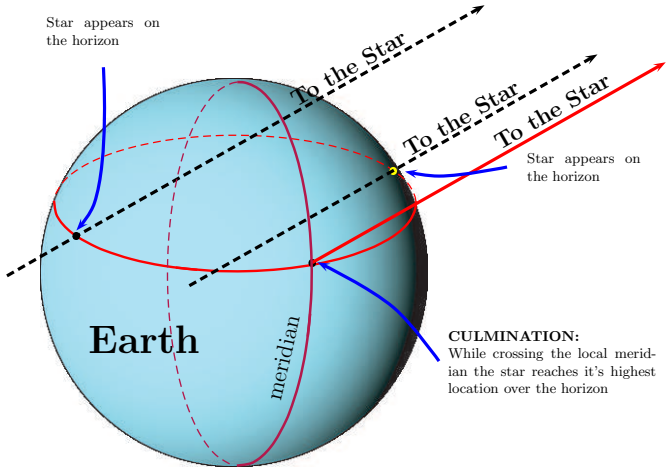

Figure 5.50: *Graph showing a star at the culmination point.*

On some Egyptian zodiacs, there is no special figure to denote the Sun, but still its location is specified in an indirect way. For example, in the Demotic Horoscope on the Brugsch's zodiac, there is no inscription neither a symbol to indicate the Sun. However, its position is clearly demonstrated by a color filling of the Scorpio's figure. This observation was already made by N.A. Morozov, who profoundly investigated the Demotic Horoscope. He wrote:

"Among the twelve zodiac constellations, only the Scorpio's figure is colored to indicate that it disappeared in the sunlight that occurs in November, and the opposite to Scorpio figure of Taurus is filled with black color to suggest that it "rules" through the whole night, or in other words, it culminates at the midnight."[42] (See Figure 5.51 (BR))

Any star or planet located on the meridian is said to be at meridian transit or culmination. At the culmination point a star appears at the highest location over the horizon (see Figure 5.50). In a similar way we can consider the culmination of a whole constellation. The sun and a zodiac constellation that culminates at the midnight are located on the ecliptic on the opposite sides (see Figure 5.52).

On a particular date, a zodiac constellation that culminates at midnight is the only one that can be observed through the whole night and therefore, it could be considered to be the "main" constellation of that night. According to Morozov's idea, the culminating at midnight constellation of Taurus, which is marked in black on the Demotic Horoscope, indicates that the Sun was located in the colored constella-

[42] See [4], Vol. 6, p. 696.

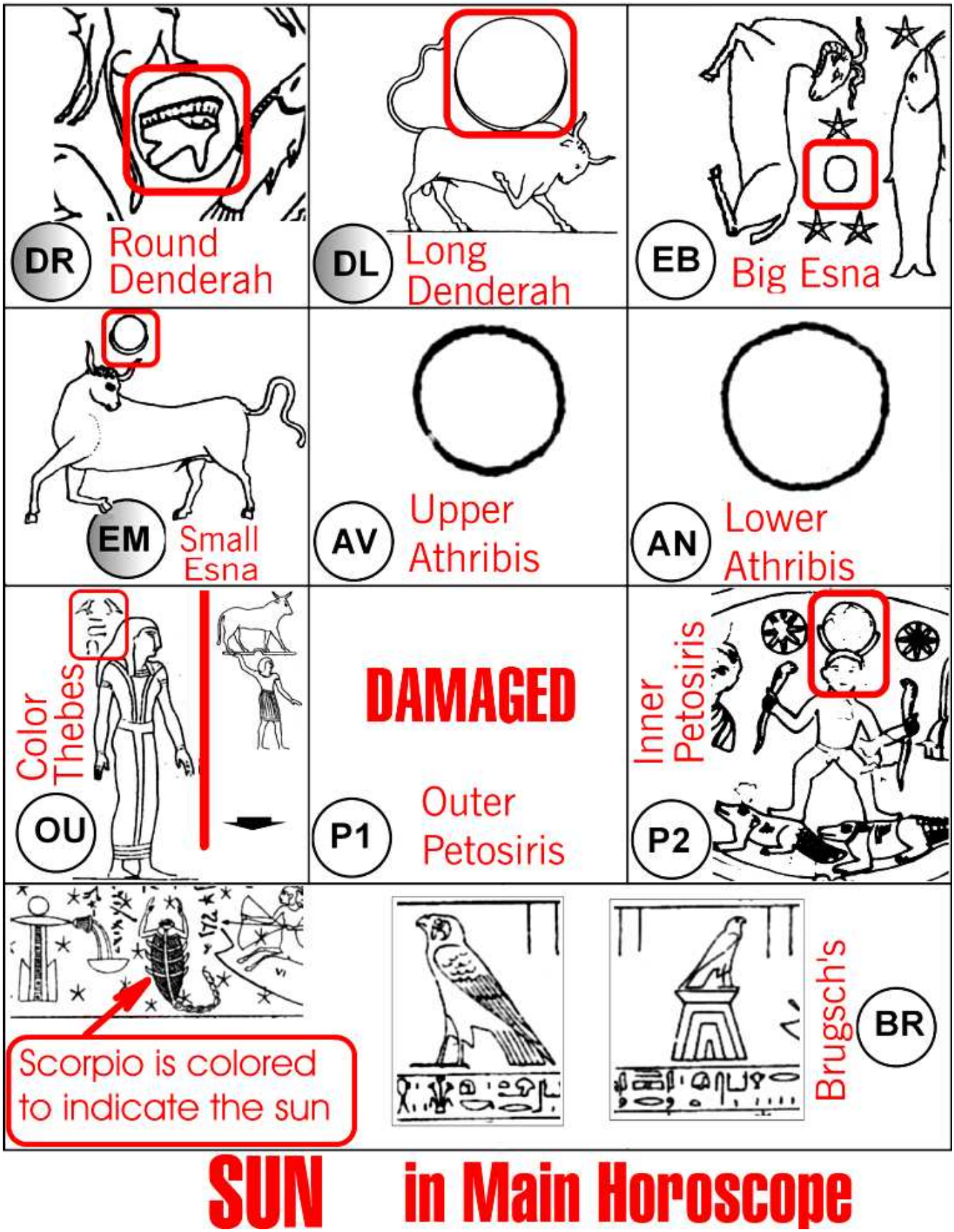

Figure 5.51: *Representations of the Sun in the main horoscope on different Egyptian zodiacs.*

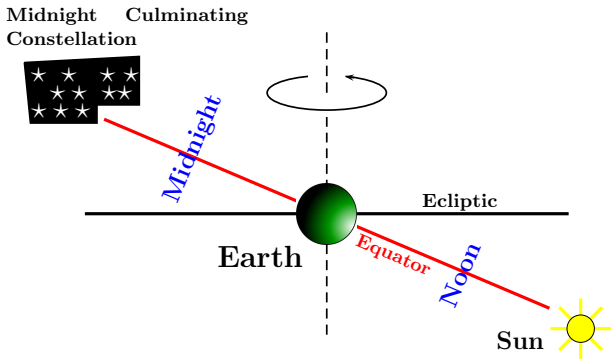

Figure 5.52: *Zodiac constellation, which culminates at midnight is opposite to the Sun on the ecliptic*

tion of Scorpio, which is situated on the opposite side of the ecliptic.

On the two other main horoscopes on the Brugsch's zodiac, the Sun is shown as a bird (see Figure 5.51 (BR)). Later, when we will discuss features of the partial horoscopes, we will present many examples of birds symbolizing the Sun. We will find out that all these birds look alike. One of such examples was already discussed, when we spoke about the partial horoscopes of the summer solstice, where the Sun is often represented as a bird sitting on a pole (see Figures 4.1 and 4.2). On the Long Denderah zodiac there are several symbols of birds, which belong to the partial horoscopes, indicating the movement of the Sun along the ecliptic. We will return to this discussion later in section 5.8, in which we will deal with partial horoscopes. Right now we would like to point out that this specific form of birds (see Figure 5.50 (BR)) was commonly used on the Egyptian zodiacs, mainly in partial but also sometimes in main horoscopes, to represent the Sun.

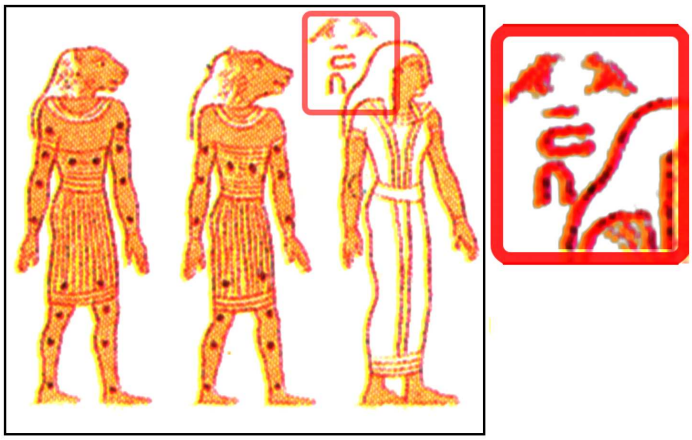

Figure 5.53: *A hieroglyphic inscription near the Virgo's head on the Color Thebes zodiac (OU).*

We have another example of a disguised representation of the Sun on the Color Thebes zodiac (OU), where there is no special symbol for the Sun. In order to find the Sun we have to look for indirect indications of its location. This is not a complicated task. Notice that on this zodiac, the constellation of Taurus is shown in the way clearly suggesting that it was culminating (see Figure 5.51 (OU)). More precisely, the symbol of Taurus is held up in a hand of a man. Consequently, the Sun at that time should be on the opposite side of the ecliptic, in the proximity of Scorpio or Libra. Our computations proved that at that date the Sun was located in Virgo near its border with Libra (see Chapter 8 for the details). We would like to mention that on the Color Thebes zodiac, there is a hieroglyphic inscription above the head of Virgo with two symbols of birds (see Figure 5.53). It is quite possible that it denotes the Sun in Virgo.

In general, finding the Sun and Moon on the Egyptian zodiacs is not very complicated procedure. However, since the Sun and Moon could be represented by similar or even identical symbols, it is sometimes necessary to consider several possible variants for their identifications in the main horoscope. There is also a possibility that the Sun in the partial horoscope of the spring equinox can be represented by a similar symbol as in the main horoscope. Therefore, in such situations additional variants should be considered. This is exactly the case of the two Denderah zodiacs.

5.4.12 The Astronomical Meaning of the Egyptian Eye Symbol

On the Round Denderah zodiac, in the circle that represents the Sun, there is a symbol of an eye (see Figure 5.54). Let us point out that the identification of this circle with the Sun in the main horoscope was obtained as a result of our computations. In particular, we also considered the possibility that it could represent Moon, but such a variant was rejected because it didn't produce a complete solution.

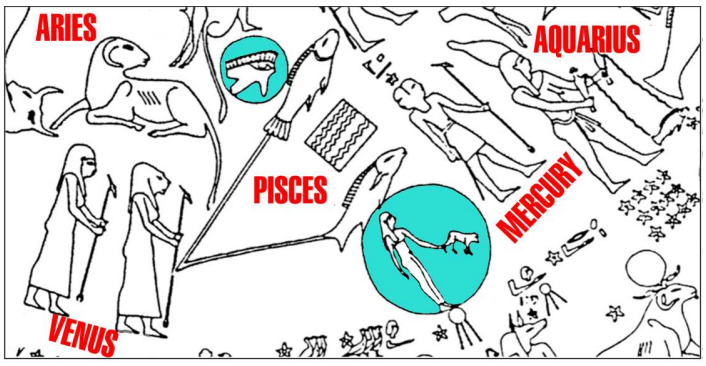

Figure 5.54: *Two representations of the Sun on the Round Denderah zodiac: the circle with an eye (in the main horoscope) and the circle with a female-Venus inside (in the partial horoscope)*

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We should explain that in the previous investigations the circle with an eye on the Round zodiac was interpreted in several different ways. For instance, N.A. Morozov identified it with the Sun[43] while T.N. Fomenko with Moon[44]. Let us notice that Egyptologists connect this symbol 𓂀 of an eye with the Sun as well as with Moon: *"The sacred eye, or the eye of Ra, or heaven, is the Sun ... But there are two eyes represented, and ... the right the Sun and, the left the moon.*[45] However, we would like to suggest another explanation of the symbol of an eye on the Egyptian zodiacs, at least in the cases when it is an attribute of a planet.

Among all the Egyptian zodiacs that we investigated, this eye appeared (in association with a planetary symbol) only twice, and in the both cases near Aries. On the Round zodiac it is placed between Aries and Pisces, and on the Outer Petosiris zodiac, it is on the head of the female representing Moon, in between the symbols of Aries and Taurus (see Figures 5.54 and 5.55). Let us observe that exactly in Aries there is a star named *Eye of Aries* or simply *Eye*, which was a famous star in ancient astronomy. Nowadays, it is called *Alpha Aries* (or simply "α*Aries*) and it is the brightest star in the Aries constellation. There is a convention, which was introduced by the German astronomer Johann Bayer in the 17th century, to assign Greek letters to stars in a constellation, according to their visibility. The symbol α is reserved for the brightest star. Aries representation as a ram (Aries in Latin is *Ram*) is identified with the Egyptian god Amon, who is more frequently found in conjecture with Ra, as Amon-Ra, than alone. So, the Egyptian equivalent for the expression *Eye of Aries* could very well be *Eye of Amon-Ra* or simply *Eye of Ra* and be symbolized by 𓂀.

Therefore, it seems that the eye, as a planetary attribute on the Egyptian zodiacs, signifies simply the fact that the planet was in the proximity of the star *Eye*. We have only two examples with the eye, and in both cases, it is related either to the Sun or Moon. Based on this information we can conjecture that this symbol was used as planetary attribute in association with the Sun or Moon only.

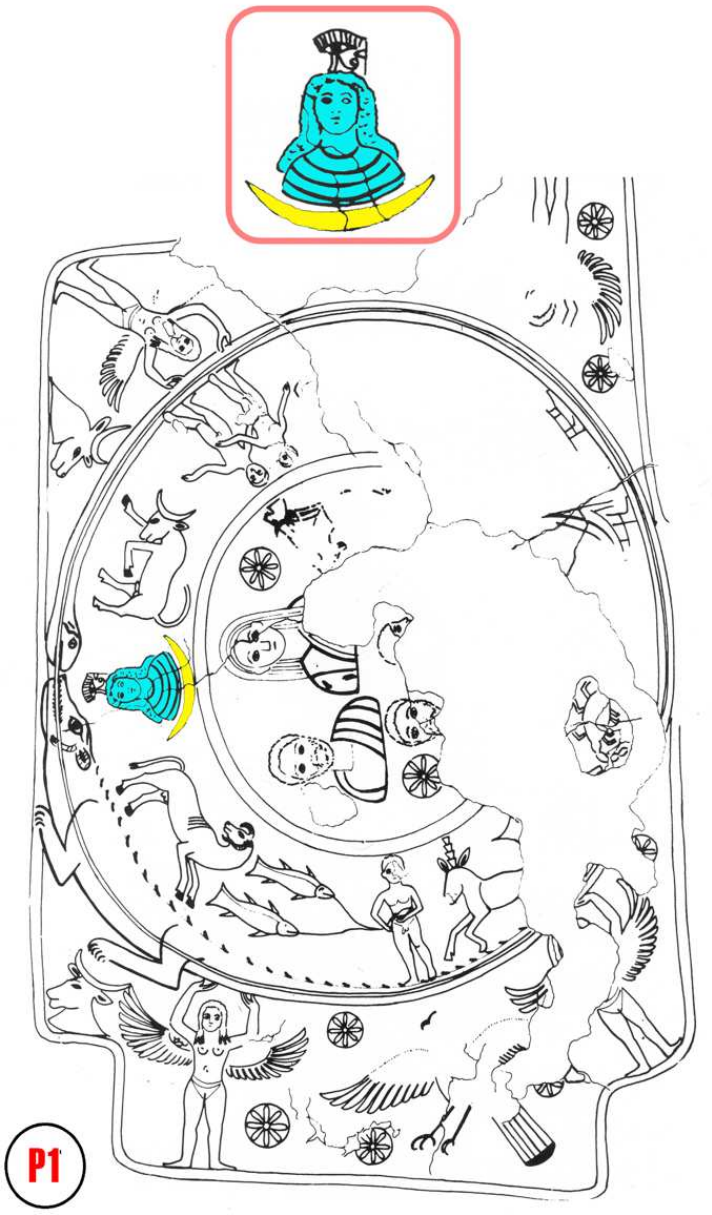

Figure 5.55: *The Outer Petosiris zodiac (P1). Moon with the eye symbol is emphasized by colors. See the enlarged detail on the top.*

5.4.13 Moon in the Main Horoscope

On Figure 5.56 we show Moon on different Egyptian zodiacs. Let us recall that we use the convention in which we mark with shaded labels for those zodiacs, where it was not possible to identify the symbol of Moon during the first stage and the identification was obtained only after the calculations.

Moon is simple to identify in the case, when there is a symbol of crescent appearing on the zodiac. For example, such symbols can be found on the both Petosiris zodiacs and the Color Thebes zodiac. It is more complicated case, when the symbol representing the Sun on the zodiac is similar or even the same as the symbol for Moon. In such situation we have to consider several possible variants. For instance, on the Small Esna zodiac the Sun and Moon have the same representation (compare Figures 5.56 (EM) and 5.50 (EM)) as a circle with a crescent marked along its lower edge. As we already mentioned, a narrow crescent could be added to the circle representing the Sun to indicated that Moon in such a form can only be located not far from the Sun. But the same symbol of a circle with a crescent was also used for Moon, so in such a case the final identification should be done based on the calculation using the additional astronomical information.

[43] See [4], Vol. 6.
[44] See [1].
[45] See [118], p. 54.

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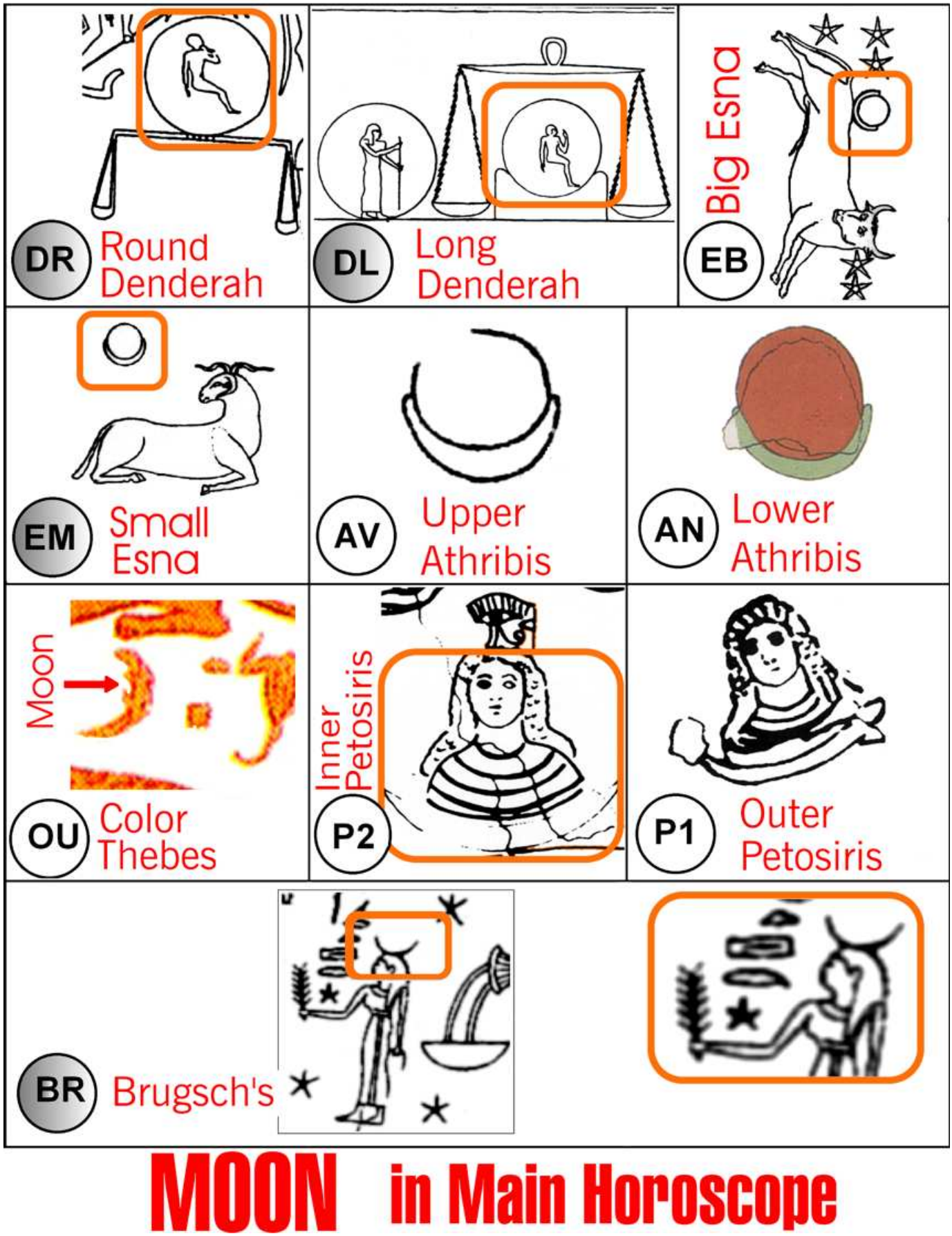

Figure 5.56: *Representations of Moon in the main horoscope on different Egyptian zodiacs*

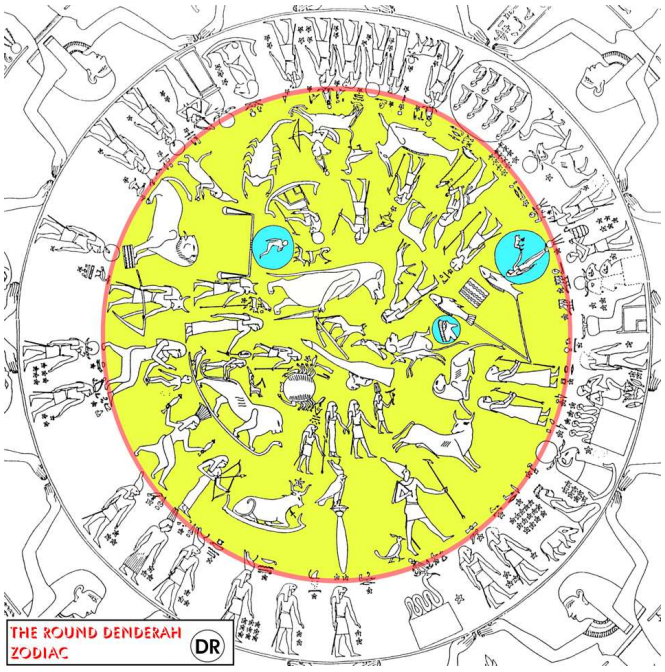

Figure 5.57: *Three circles (marked in blue) in the planetary area (colored for clarity) on the Round Denderah zodiac.*

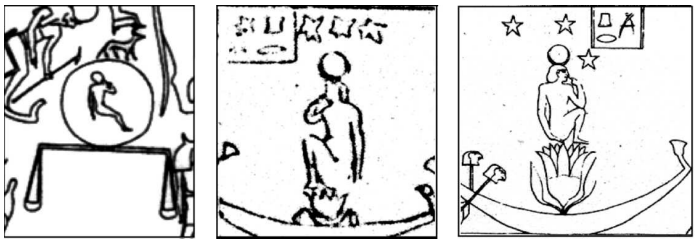

Figure 5.58: *Infant figure with a finger in the mouth on the Denderah zodiacs: on the left – from the Round zodiac, in the middle and on the right — from the Long zodiac (from Bode's Uranographia and the same figure from the Napoleonic album).*

Our identification of Moon on the Denderah zodiacs was obtained after long computations involving several possible variants, but verification of the additional data showed that in fact there is only one possibility for the correct identification. The calculations were conducted independently for each of the Denderah zodiacs and the same figure turned out to represent Moon in the both cases. This figure was somehow unexpected because previous investigators didn't even consider it as a planetary symbol. In their research the existence of the partial horoscopes wasn't realized and consequently some important symbols were disregarded. For example, on the Round zodiac there are *three circles* in the area of the zodiac constellations. Not surprisingly, one of these circles was dismissed by N.A. Morozov, who assumed that it was representing the "goddess of justice" or other divinity. This was the circle on Libra (see Figure 5.57). Morozov's explanation was accepted by several other researchers. The results of our calculations proved the contrary — this was the symbol of Moon in the main horoscope (see Figure 5.56 (DR)).

In spite of the fact that this identification was obtained as a result of computations, it seems to be natural. Moreover, Morozov himself explained a similar figure on the Long zodiac as a symbol of Moon (see Figure 5.58). He wrote the following: *" ... the figure of a girl has a Moon symbol on her head. The absence of breast and her finger in the mouth indicate that she is a child."* We show the symbols described by Morozov in the middle (from Bode's Uranographia) and the right (from Napoleonic album) pictures on Figure 5.58. On the left picture we show the same figure of a child (with a finger in the mouth) inside the circle, that we identified as the symbol of Moon. Notice that among all the planets or stars only Moon is changing its appearance and is called either *young* or *old*. In this way the symbol of a child should be associated with Moon and Morozov was right with this idea. Let us explain that the symbol of the child-Moon, described by Morozov belongs to the secondary line on the Long Denderah zodiac, outside the main horoscope area. Strangely, he didn't recognize the same symbol in Libra on the both Denderah zodiacs. His claim that it is the "justice goddess" or Hercules contradicts its appearance in a form of a child.

5.5 Planetary Symbols in the Partial Horoscopes

The Egyptian symbols of planets in the partial horoscopes are usually very different from the planetary symbols in the main horoscopes, and that's exactlt how it should be. Otherwise, it would be impossible to extract the main horoscope, understand its meaning and decode the date of the zodiac. Apparently, the ancient Egyptian astronomers and artists didn't want to create confusion and tried to avoid mixing up the symbols of the main and partial horoscopes. We have to acknowledge that they succeeded in achieving this goal. In most of the cases, it is hard to mistaken a planet from a partial horoscope for a symbol from the main horoscope.

The partial horoscopes on the Egyptian zodiacs are associated with the solstice and equinox points. In particular, all of them are located around the symbols of the same four zodiac constellations, which contain these four points. Recall, that the equinox point is a position of the Sun, when day and night are of equal length, and a solstice point is Sun's location when day or night is shortest. These four points move along the ecliptic, but their movement is very slow. It needs thousands of years to travel across one zodiac constellation. Therefore, it is not surprising that on every investigated by us Egyptian zodiac the autumn equinox is always shown in Virgo, the winter solstice — in Sagittarius, the spring equinox — in Pisces, and finally, the summer solstice — in Gemini.

The partial horoscopes always reside near the same four zodiac constellations, which in many aspects affect their ap-

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pearance. For example, some planetary symbols in the partial horoscopes are often integrated into the constellation figures in a form of attributes or some objects, which at the first glance may look insignificant. As a matter of fact, the structure of the partial horoscopes can be drastically different from the structure of the main horoscope. Even a smallest detail of the partial horoscope may contain some important astronomical information. During the last centuries, the existence of partial horoscope was overlooked by Egyptologists and all the previous investigators. It is surprising how it is possible that so many experts were not able to understand correctly the principal structure of an Egyptian zodiac. An explanation to it could be the fact that their efforts were concentrated on individual zodiacs, without an attempt to make a careful and complete comparative analysis of multiple Egyptian zodiacs. The symbolism of the partial horoscopes was understood only after comparing all the known to us Egyptian zodiacs. We noticed that similar symbols or details appear on different zodiacs not chaotically but in a certain organized way. The further investigation revealed that on the Egyptian zodiacs, apart from the main horoscopes, there are also shown planetary configurations associated with the four solstice and equinox points, which we call the *partial horoscopes*. These partial horoscopes appear on almost all the Egyptian zodiacs, not only on few "exotic" ones.

We are not going to present detailed tables of the planetary symbols in the partial horoscopes, like it was done for the main horoscopes. These symbols are more individual, less uniform and often integrated into the other symbols as their parts, so it is very inconvenient to discuss their meaning out of the zodiac context. In this section we only initiate a discussion of the symbolism of the partial horoscopes, and later, we will return often to this topic. In particular we will present a detailed explanation of the partial horoscopes in Chapters 7 and 8, which are devoted to the decoding and dating of the zodiacs. Here we will only review several concrete examples just to give an idea how a partial horoscope is constructed in principle. One of these examples will be the partial horoscope of the winter solstice on the Round Denderah zodiac. This is the most famous Egyptian zodiac and its symbolism was analyzed and discussed in many works. Let us emphasize that our interpretation of the symbols belonging to the partial horoscopes is completely new.

5.5.1 First Example: Partial Horoscope of Autumn Equinox on the Long zodiac

On Figure 5.59, we show a fragment of the Long Denderah zodiac around the Virgo constellation. Recall that Virgo is the place for a partial horoscope of the autumn equinox, and indeed such a partial horoscope can be found there.

In order to understand the astronomical symbolism shown on Figure 5.59, first of all we have to remember that on the Long Denderah zodiac every constellation is represented by three decans (see Section 5.2.1), one of each is the specific figure of the constellation, and two others are the female figures, which all look alike. The symbol of Virgo is a female figure holding a spike in her hand (see Figure 5.53) and the two decans are behind her (see Figure 5.22). In this way Virgo's symbol serves as her first decan. The partial horoscope of the autumn equinox is integrated into the second decan figure of Virgo, which on Figure 5.59 is shown enlarged. Immediately, one can notice that there is something different about this symbol. There are some planetary attributes incorporated and added here. The Sun is represented in a form of a bird near the girl-decan's head. Such figure of a bird indicates on the Long zodiac the places where the additional astronomical information related to the Sun and nearby planets was inserted.

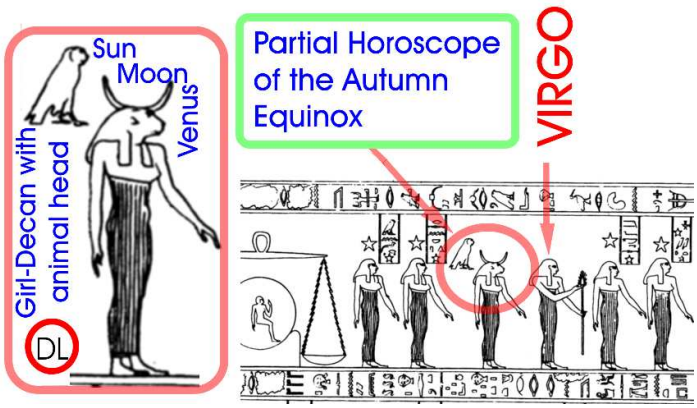

Figure 5.59: *Partial horoscope of the autumn equinox on the Long Denderah zodiac.*

The symbol of Venus and Moon can also be distinguished here. As it was already discussed in Section **??**, one of the Egyptian attributes was a lioness. For example, Venus was often shown as a female figure with a lioness head. This is for example the case on the Round Denderah zodiac (see Figure 5.42). Notice that the head of the second girl-decan in Virgo is not human but animal, and could definitely be a lioness head. Moreover, the bird representing the Sun also has animal face similar to a lioness head (see the enlarged detail on Figure 5.59). Let us point out that among all the 24 girl-decans on the Long zodiac there are only two with modified appearance. The another one is the girl-decan with a falcon head between Scorpio and Libra. Since we are going to discuss this topic later, let us simply indicate that this symbol also carries the planetary information. In this case it is for the partial horoscope of the winter solstice. Notice that the second girl-decan of Virgo actually looks the same except for the planetary stick. Of course, if there was a planetary stick in her hand, it would be definitely a figure of Venus from the main horoscope with its usual lioness attribute. However, by expressing this incomplete Venus-alike look, the Egyptian artist achieved the goal of showing Venus in the partial horoscope without creating confusion about the main horoscope. The same girl-decan has another attribute — a crescent placed on her head. She

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is the only decan with a crescent on her head, which can be recognized as the symbol of Moon in this partial horoscope.

To conclude this section, let us remark that there could be possibly another variant of decoding this partial horoscope. On Figure 5.59, we have recognized the face of the second girl-decan as lioness, and consequently we deciphered this partial horoscope as: the Sun, Venus and Moon in Virgo. However, the drawing of the Long zodiac is not very precise and this face could also be recognized by someone as a bull-face. In this case the decoding of the partial horoscope of the autumn equinox would be completely different. On many Egyptian zodiacs, including Denderah zodiacs, the bull-head with a crescent symbolizes Saturn (see Figure 5.28), so in this case it would be the symbol of Saturn (instead of Venus and Moon). Venus, which is usually present in the partial horoscopes because it is never too far from the Sun, still could be recognized here as the lioness head of the bird representing the Sun. In principle, this decoding is also good, however, it is not possible, because it contradicts the location of Saturn in the main horoscope. As the matter of fact, the motion of Saturn is so slow that during the whole year it usually resides in one constellation only. But Saturn in the main horoscope is in between Aquarius and Capricorn, which is much too far for it to be in Virgo within one year. Consequently, it makes no sense to even consider such a variant, because no solution could ever be found for it.

5.5.2 Second Example: Partial Horoscope of Winter Solstice on the Round zodiac

On Figure 5.60 we show a fragment of the Round Denderah zodiac around the symbol of Sagittarius.

Let us recall that on the Egyptian zodiacs, Sagittarius is the location for the partial horoscope of the winter solstice. Here, similarly as it is on other Egyptian zodiacs, the figure of Sagittarius has incorporated additional symbols of Mercury and Venus. They are shown by a two-faced head of Sagittarius. One face is human (Mercury) but another one is of a lioness (Venus). These is the standard Egyptian symbol of Sagittarius with a minimal partial horoscope incorporated in it. We will discuss this symbol in more details in Section 5.8. Notice that one half of the horse-tail of Sagittarius is standing up and on its top there is a goose, which on Egyptian zodiacs is associated with Mars. That means, Mars is present in this partial horoscope.

The presence of additional attributes incorporated into the figure of Sagittarius is indicated by a special Egyptian *pull-out* symbol, which is here a small boat under the front legs of Sagittarius. We will explain later in more detail, why the symbol of a boat or any other symbol, placed right under the feet of a figure, means that this figure was *pulled-out* (in time or in space) from its proper place. On the Egyptian zodiacs of the round type, where the symbols are arranged one under another, in order to avoid confusion only boats were used as pull-out symbols. In particular, if a pull-out

Figure 5.60: *Surrounding of the Sagittarius constellation with the partial horoscope of the winter solstice on the Round Denderah zodiac.*

symbol is an attribute of a planet, it means that this planetary symbol doesn't belong to the main horoscope. In the case of Sagittarius, the boat indicates that there is something here not belonging to the main horoscope.

Notice other figures located right above the Sagittarius symbol. One of these figures holds a planetary walking stick but it is does not belong to the main horoscope, because it is placed on a boat — a pull-out symbol. Two other figures do not have walking sticks — one of them holds a mace and another a whip, so they are not related to the main horoscope either. All these symbols are located in a proximity of Sagittarius, which means that they are related to the partial horoscope of winter solstice. The planetary symbols of this partial horoscope are:

1. A man with a mace in his hand denoting a male planet, i.e. it could be any planet except Venus.
2. A figure sitting in a chair on a boat with a big circle on its head holding a planetary walking stick. On the Egyptian zodiacs, the circle placed over a head always denotes the Sun, so this figure could symbolize either the Sun or a planet close to it. In the first case, the circle should be looked at as an integral part of the figure representing the Sun, and in the second case, it indicates that a certain planet represented by this figure was near the Sun. In our calculations the both variants were considered. It is not possible to be sure about the gender of this figure because it is in a sitting position (so we are not able to judge the size of its step) and the quality of the image is poor.

3 A small figure sitting on a chair with an animal under its feet. On the drawing shown on the left side in Figure 5.60, this animal looks like a dog but on the actual photograph, shown on the right, it resembles a lioness or a leopard. If it was a lioness, then it sands for Venus. But, the picture is unclear, so all the possible variants had to be taken into account.

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Let us resume that in this partial horoscope there are the Sun and two or even three planets included. One of them is Mars.

5.5.3 Third Example: Partial Horoscope of Summer Solstice on the Lower Athribis zodiac

On Figure 5.61 we show a fragment of the Lower Athribis zodiac around the constellations of Libra, Virgo, Cancer, Gemini and Taurus. On Figure 5.61 one can easy recognize all the figures representing these constellations, which we colored in red for more clarity. They form the upper row of symbols, under which one can see two birds (in yellow) representing planets in the main horoscope, and further below them, there is another row of symbols (in blue), which is the partial horoscope of summer solstice.

Figure 5.61: *A fragment of the Lower Athribis zodiac with a partial horoscope of summer solstice. We marked the constellation figures in red, planets of the main horoscope in yellow and the partial horoscope in blue.*

Let us notice that there is no partial horoscope of autumn equinox present on the Lower Athribis zodiac. It should be located under Virgo, but the whole space here is occupied by the symbols of the partial horoscope of summer solstice. In fact this is the only (nontrivial) partial horoscope on the both Athribis zodiacs (see Chapter 8 for more discussion).

Let us look carefully at the row of the blue figures. Many of them are already familiar to us. Starting from the left of the picture, we see a bull lying on a boat with a star between his horns, then there is a male figure with a raised hand surrounded by five birds with human faces, two on one side and three on the other. The bull in the boat is a standard Egyptian symbol of the summer solstice. This symbol sometimes is shown accompanied by a female figure shooting an arrow over its head (see for example fragments of the zodiacs (DR) and (EM) on Figures 4.1 and 4.5). The man with a raised hand is also a standard Egyptian symbol of the summer solstice (see Figures 4.2 and 4.5). It symbolizes the Sun in its highest position. These two symbols always appear in a proximity of Gemini. On the Lower Athribis zodiac, the imaginary ground line, where the man with a raised hand stands on, passes exactly through the symbol of Gemini, so we can simply say, that he "stands" in Gemini. Consequently, these symbols are definitely related to the partial horoscope of the summer solstice.

Now, let us recognize the planetary symbols of this partial horoscope. It is not hard to find them. Recall that on the Athribis zodiacs, the planets are usually symbolized as birds, and indeed we see here five birds with human faces. This fact means that at the summer solstice, there were all five planets present near Gemini around the Sun. It could be possible that Venus or Mercury were shown here not by one but by two birds, but it is very unlikely because in the main horoscope Venus is represented by one bird figure (Mercury in the main horoscope is not a bird — see Chapter 8). Let us say that these partial horoscope indeed appears to be very precise. The full solution computed for this zodiac ideally exhibits all the features of this picture. In particular, it turns out that at the summer solstice there were two planets ahead of the Sun (visible in the morning) and three other planets behind of it (Visible in the evening). This simply means that on the summer solstice day there were all five planets present near Gemini around the Sun.

5.6 Boats, Snakes, and Other Objects under the Feet of Figures as *Pull-Out* Symbols

A carefully study of the Egyptian zodiacs leads to the following observation. Some figures appear on zodiacs without any support under their feet, while other clearly stand on something or even are enclosed inside other objects. Often, they stand on boats or snakes which are sometimes shaped like boats. On an Egyptian zodiac, the same figure may appear in one place floating on a boat and in another place without it.

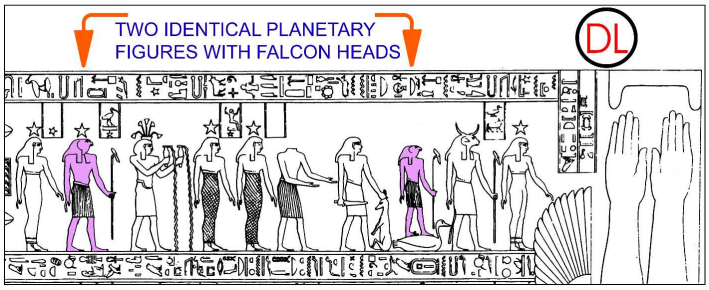

Figure 5.62: *A fragment of the Long Denderah zodiac showing Mars in the main horoscope and with a pull-out symbol*

On Figure 5.62 we present a fragment of the Long Denderah zodiac, where two identical figures with planetary walking sticks can be identified. These are the male figures with

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falcon heads. As they are shown exactly in the same way, they should represent the same planet. But, as we have already justified it earlier, an Egyptian zodiac is in fact an astronomical symbolic message that was intended to be readable. Notice that one of these figures is located on the left of Aquarius and the another one is placed on its right, far away from the first one. There are many other figures between them (see Figure 5.62). As their positions are far apart, they represent the same planet but at two different dates! However, there is something distinct about the way they appear — one is simply walking while the another one is floating on a goose (see Figure 5.62).

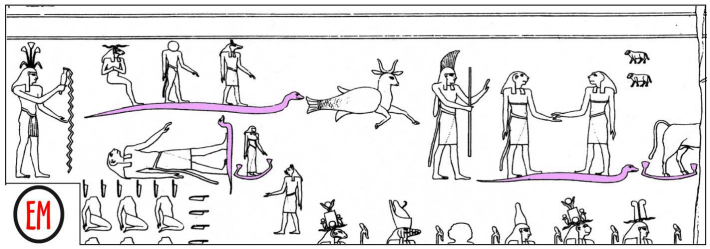

Figure 5.63: *A fragment of the Small Esna zodiac showing several figures on snakes or boats*

On the Egyptian zodiacs one can find many examples of this kind. On almost every zodiac there are figures (planetary or not) standing or sitting on other objects. In the most cases, these objects are boats or snakes but sometimes they are other animals or things. As an another example we show on Figure 5.63 a fragment of the Small Esna zodiac (EM), where one can see several figures standing on boats or snakes.

Our comparative analysis of the Egyptian zodiacs proved that all these "supporting" symbols of boats, snakes, geese, etc., have a definite astronomical meaning. Namely, they are the *pull-out* symbols applied to those figures on the zodiac that were displaced from its proper position on the zodiac (either in time or space).

The use of the *pull-out* symbols was very common on Egyptian zodiacs. It was a smart method that allowed ancient artist and astronomers to put together on the same zodiac more than one horoscope displaying astronomical description of several related dates. The *pull-out* symbols applied to a planetary figure created a new meaning for it, making clear that it does not belong to the main horoscope. As all the partial horoscopes have fixed locations on the ecliptic, in practice there is no confusion between them either. Moreover, by applying the *pull-out* symbols, an Egyptian artist was able to design more freely the whole zodiac. For example, he was able to move some figures from the overcrowded areas on a zodiac to other places. For this purpose it was sufficient to use a *pull-out* symbol and assure that there are adequate indications of its proper location. For instance, on Figure 5.63 there is a symbol of the spring equinox, represented by two male figures holding hands. Notice two small lambs near them indicating that this configuration speaks about the spring equinox (if there were two lions instead of lambs, it would be an indication of the autumn equinox). Indeed, a lamb symbolizes Aries, which is the neighboring constellation for the spring equinox point, and a lion symbolizes Leo, which is the neighboring constellation to the autumn equinox. Notice that the actual location of this symbol of the spring equinox, which is in between Capricorn and Sagittarius, is not proper for it. However, the whole picture is still correct because of the usage of the *pull-out* symbol in a form of a snake.

Let us recall that in the case of Egyptian zodiacs of the round type the *pull-out* symbols are limited to snakes or boats only. There are some exceptions, but only in special cases.

5.7 Signs of Visibility of Planets in the Main Horoscope

When a planet, in its apparent motion around the ecliptic approaches the Sun, it loses its visibility. For example, it rises closer to the morning and finally it is only visible for a short time during the sunrise and disappears completely for several days. It reappears again on sunset and continue to be visible in the beginning of the night. A planet can also be visible for a short time following the sunset and gradually completely disappears from the sky for few days and then reappears at the dawn. In average, outer planets Jupiter, Saturn and Mars disappear from the sky only once per year, while the inner planets are invisible more often. In fact Venus and Mercury can only be observed in the beginning and the end of the night and continuously appear and disappear from the sky. Therefore, it was quite possible that on the date encoded in an Egyptian zodiac, Mercury and/or Venus were not visible. N.A. Morozov noticed that the visibility of a planet was accurately indicated on the Egyptian zodiacs. For example, on the Denderah zodiacs a symbol of a star placed above (or near) the head of the planetary figure symbolizes its visibility[46].

On Figure 5.64 we show two fragments of the Long and Round Denderah zodiacs, where some visible planets around the Sun (which we marked in yellow) are indicated by a star (marked in red) placed above their heads. We marked these planets in light-blue Color. On each of the Denderah zodiac there is one invisible planet (colored by us in brown), where a star near its head is missing. As some of the planets on Figure 5.64 were represented by double figures, for better clarity we encircled with a yellow contour each of the planetary representations.

We checked the Morozov's hypothesis about the visibility attributes on the Egyptian zodiacs and we can confirmed it. It turned out that on many Egyptian zodiacs the visibility or invisibility of planets was indeed indicated. It was done

[46] See [4], Vol. 6, pp. 765, 678, 679.

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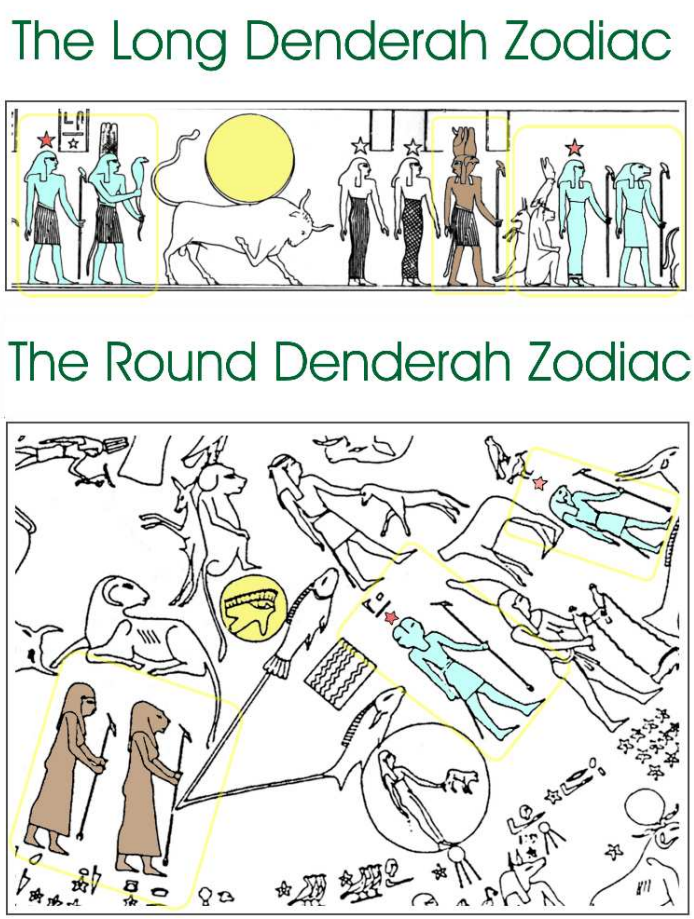

Figure 5.64: *Visible (marked in light-blue Color) and invisible (marked in brown Color) planets on the Long (upper picture) and Round (lower picture) Denderah zodiacs.*

carefully for the planetary symbols in the proximity of the Sun, where this information actually was important. In the case of the planets located far away from the Sun, where there couldn't be any doubt about their visibility, this rule was not so rigorously applied, but still used.

For the majority of the Egyptian zodiacs, the sign of visibility was a star placed above the planetary figure, similarly like it was done on the Denderah zodiacs. However, on certain zodiacs another method was used. For example on the Big Esna zodiac, instead of the visibility sign there was used the invisibility sign, which was a disk replacing the head (or sometimes on the head) of a planetary figure. This convention is logical and shows that the creators of this zodiac had a good understanding of this phenomena — a planet becomes invisible because the Sun "blazes" its face.

On Figure 5.65, we show a fragment of the Big Esna zodiac with the partial horoscope of autumn equinox. We indicated with colors only the planetary figures belonging to this partial horoscope. On this zodiac, the figures of the partial horoscopes do not hold walking sticks. The invisible planets

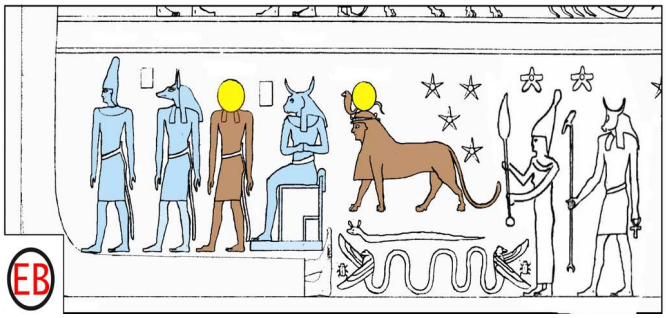

Figure 5.65: *The partial horoscope of autumn equinox on the Big Esna zodiac with the invisible (marked in brown) and visible (marked in light-blue) planets. The invisibility symbol (a disk) is marked in yellow.*

(marked in brown) have a disk (marked in yellow) placed on the head or instead of it.

Let us recall that Mercury, which is a fast moving planet, was sometimes represented on the Egyptian zodiacs in two positions, one visible and another invisible. It is for example the case on the Long Denderah zodiac (see Figure 5.66).

For each investigated by us Egyptian zodiac, there exists an astronomical solution for which

- all the planetary locations are the same as in the main horoscope;
- the order of planets is exactly the same as in the main horoscope;
- all the partial horoscopes are satisfied;
- the visibility/invisibility conditions are also fulfilled.

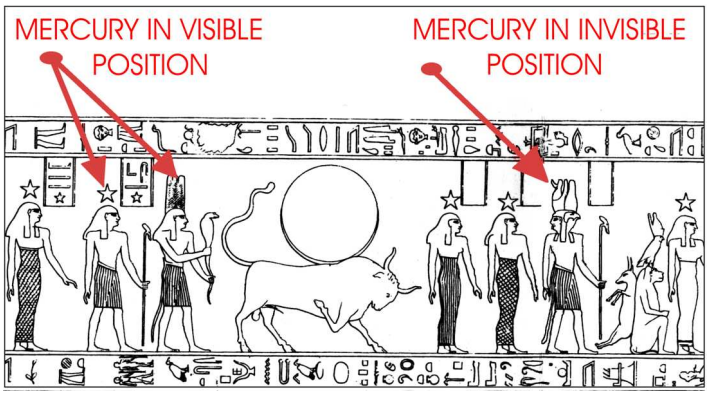

Figure 5.66: *A fragment of the Long Denderah zodiac with Mercury in two positions: visible and invisible.*

Being able to find such "perfect" solutions for all the investigated zodiacs, we can confirm that Morozov's claim about the visibility/invisibility symbolism was indeed correct.

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It wouldn't be possible to find randomly such solutions for all the zodiacs without exceptions.

5.8 Symbols of Equinoxes and Solstices

The equinox and solstice points are marked on Egyptian zodiacs using special symbolism. These symbols for the first time were decoded by us during our study of the Egyptian zodiacs. They are used on different zodiacs systematically and consistently in very similar forms so, it is not hard to understand their meaning.

The symbols of the equinoxes and solstices are very important for the astronomical dating. In particular, they mark the locations of the partial horoscopes. Let us point out that some of these symbols were misinterpreted in the existing literature. We will discuss some of the examples in the following subsections.

Earlier, we've already discussed some of the equinox and solstice symbols used on the Egyptian zodiacs[47]. In this section we will systematically examine this symbolism.

5.8.1 Symbols of the Autumn Equinox in Virgo

On Figure 5.67 we show the Egyptian symbols related to the autumn equinox. These symbols can be found on the Egyptian zodiacs only in the proximity of Virgo or possibly near Pisces, where the spring equinox occurs. Notice that the spring and autumn equinoxes are located symmetrically on the opposite sides of the ecliptic. From the astronomical point of view they are similar, so, it is not surprising that they share some of the symbols (but not all of them).

Let us list the symbols of the autumn equinox (see Figure 5.67):

(1) *A human figure holding a child on his/her hand.* This symbol appears on the both Denderah zodiacs in the proximity of the autumn equinox. Recall that the Egyptian new year began in September near the autumn equinox[48], so the figure of a child probably symbolizes here the new year.

(2) *Rectangular plate with wavy lines.* On the Round Denderah zodiacs one can find two such plates located near the spring and autumn equinoxes. On the Long Denderah zodiac one such plate is located near the spring equinox point. Notice that on the Round zodiac, a figure of lion reposes his two front legs on it. We should point out that sometimes the Egyptian equinox symbols contain signs of the neighboring constellations — Leo for the autumn and Aries for the spring equinox (see for example Figure 5.67 (DR), (EB) and Figure 5.69 (EM)). N.A. Morozov correctly identified these rectangular plates on the Round zodiac as symbols of the equinoxes[49].

(3) *A person sitting on a chair with spread out arms holding two identical objects.* This figure clearly indicates the equilibrium (between the left and right hands) which most probably symbolizes the equilibrium point between the day and night occurring at the equinox point. However, we found only one example of such figure (see Figure 5.67 (DR)).

(4) *A self-entwined snake.* This symbol appears on several zodiacs and it is always located near the autumn equinox. Among the Egyptian zodiacs that we investigated, this symbol occurred on the Long Denderah, Small Esna and Lower Athribis zodiacs (see Figure 5.67 (DL), (EM) and (AN)).

(5) *Two-headed wave-shaped symmetrical snake.* Sometimes a pair of small wings is attached near each head (see Figure 5.67 (EB)) without disturbing its symmetry. This symbol can be found near the both equinox points and undoubtedly it indicates the equality between the day and night.

(6) *A figure on a podium with a diagonal cross.* In our examples a figure on the podium is either a bird or a human. This symbol was used on the Egyptian zodiacs for the autumn equinox (see Figure 5.67 (EM)) as well as for the spring equinox (see Figure 5.69 (EM)). Let us point out that such symbol, where the podium is without a diagonal cross, indicates not an equinox but a solstice point. In this case usually on the podium there is a cobra in threatening position (with upright fore body). The diagonal cross likely indicates the equality of a day and night.

(7) *A figure with four heads.* It can be associated with the autumn and spring equinoxes. On Brugsch's zodiac, the equinox and solstice symbols are located in the four corners of the picture. The symbol of the autumn equinox is placed on the same side as Virgo. It has a body of a horse with four lamb heads (see Figure 5.67 (BR)). On the Inner Petosiris zodiac, near the Virgo constellation there is a male figure with the same four lamb heads (see Figure 5.67 (P2)).

5.8.2 Symbols of the Winter Solstice in Sagittarius

The symbols, which were used on the Egyptian zodiacs to denote the winter solstice are shown on Figure 5.68. They are always located in vicinity of Sagittarius. Let us list them:

(1) On almost all the Egyptian zodiacs the figure of Sagittarius incorporates symbolism of the minimal partial horoscope of winter solstice. This is a complex figure including a centaur (the symbol of Sagittarius) and also signs of the Sun, Mercury and Venus. We illustrate this *astronomical hieroglyph* on Figure 5.69.

[47] See for example Section 4.2

[48] See [4], Vol. 6, p. 641.

[49] See [4], Vol. 6, p. 658.

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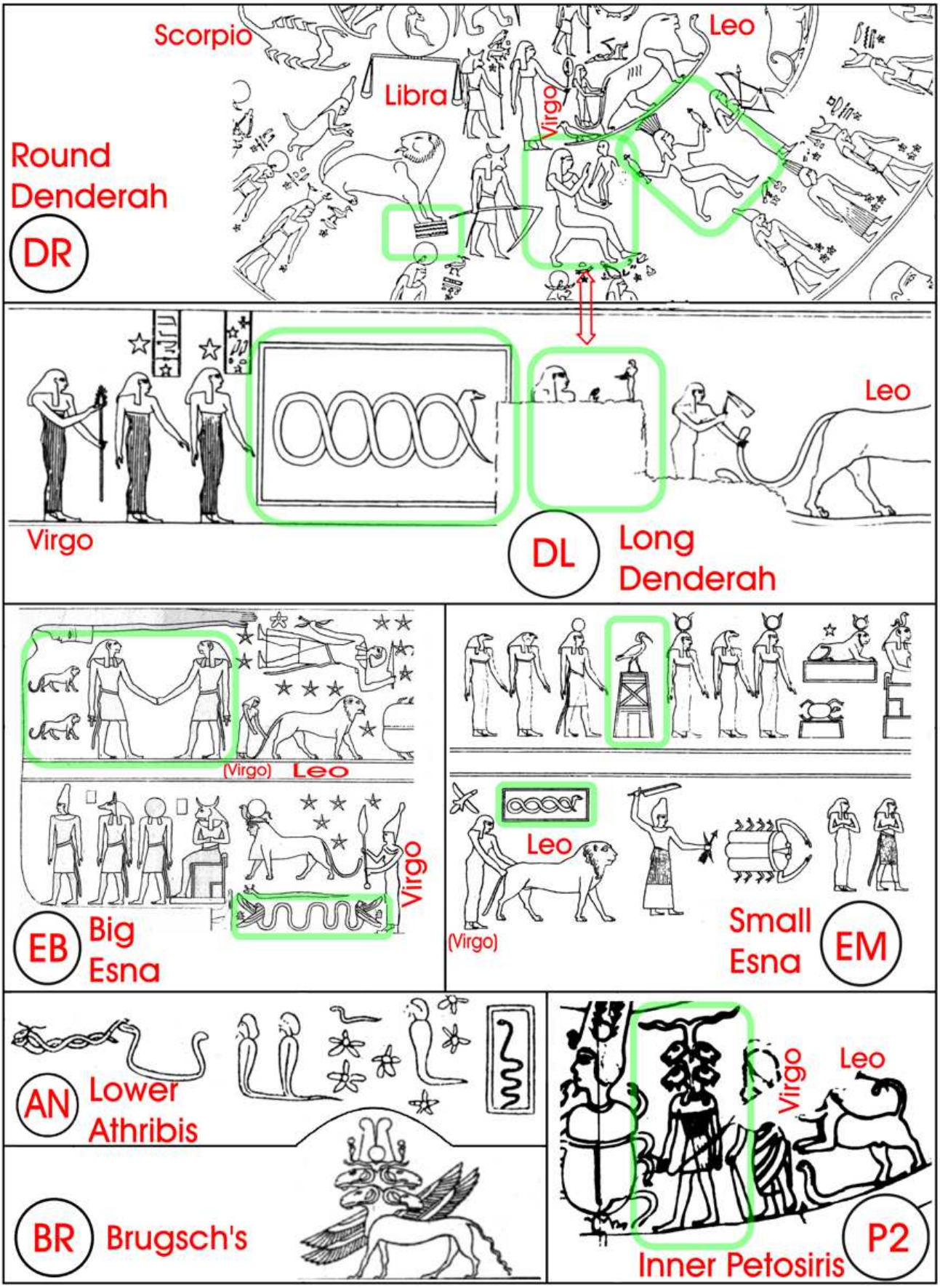

Figure 5.67: *Symbols of the autumn equinox on different Egyptian zodiacs. In some cases these symbols are encircled by green contours to distinguish them from other symbols*

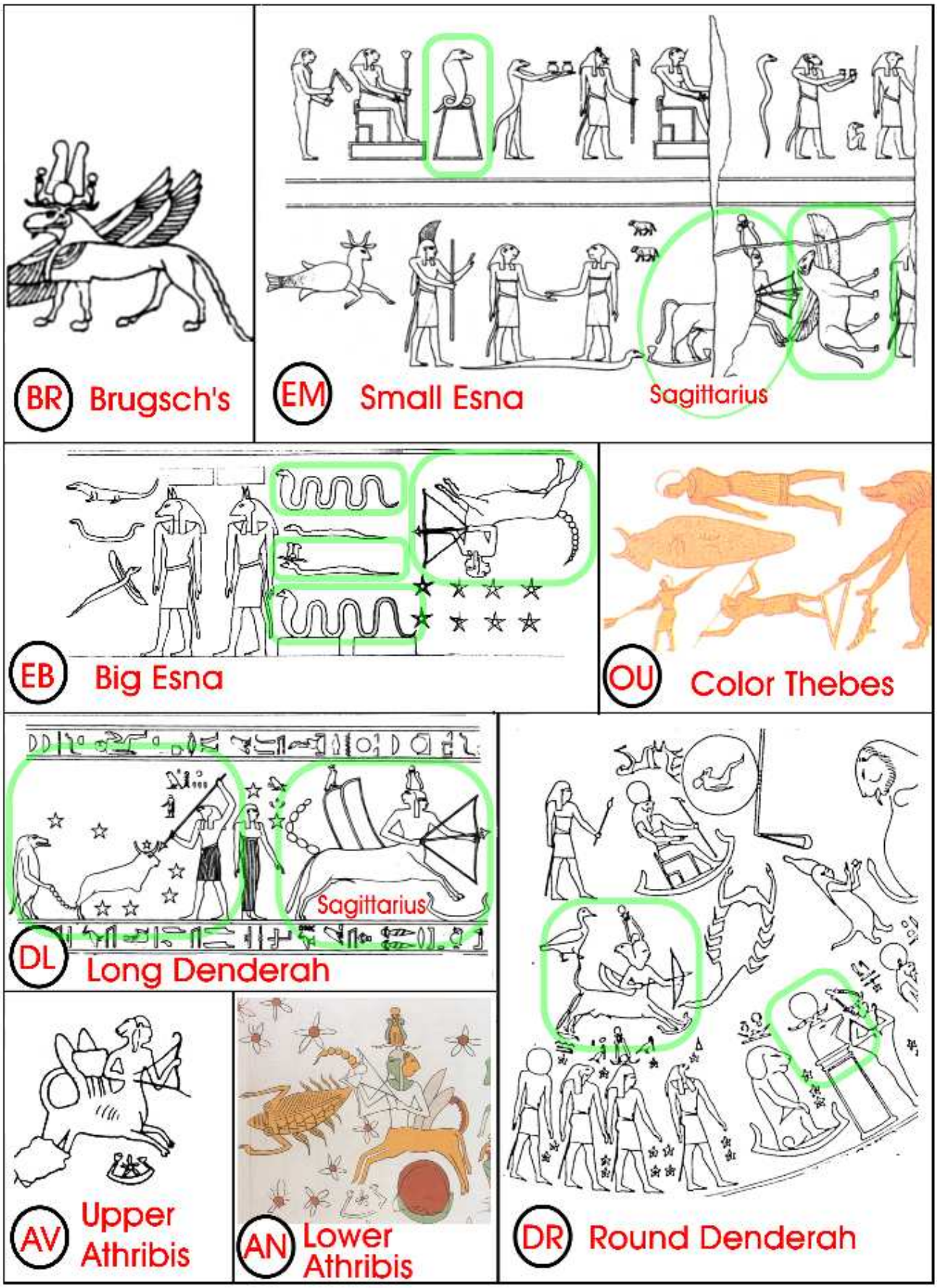

Figure 5.68: *Symbols of the winter solstice on different Egyptian zodiacs. Some of these symbols are encircled by green contours to distinguish them from other figures.*

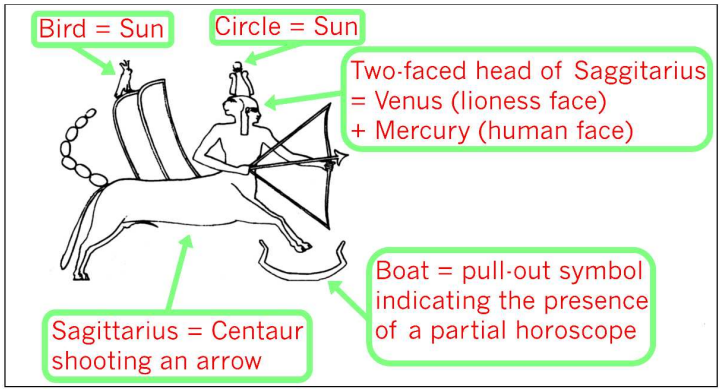

Figure 5.69: *Figure of Sagittarius with a minimal partial horoscope of winter solstice*

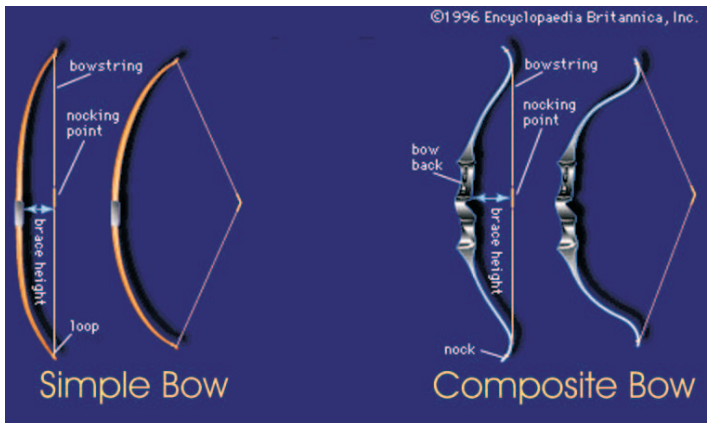

Figure 5.70: *A picture of a simple bow and a recurved composite bow.* (Taken from Encyclopedia Britannica Online)

Notice that Sagittarius on some Egyptian zodiacs is shooting an arrow using the so called *composite recurved bow*, which was in common use in middle ages. According to history of weapons, the composite bow was invented in the 11th century. It was more powerful than a simple bow but much more complicated to produce. Its advantage was that it could be engineered to essentially any desired strength. Its characteristic shape is easy to recognize — the bow is curved away from the archer (see Figure 5.70).

We would like to indicate that all the astronomical dates obtained by us for the Egyptian zodiacs are later than the eleventh century, which is exactly the period of the common use of the recurved composite bows. According to the conventional chronology, which places the Egyptian zodiacs thousands years earlier, the presence of the composite bows on these zodiacs creates a strange situation in which historians must acknowledge their invention thousand years before their common usage by military. For a weapon, which was a very practical object, such disappearance sounds highly suspicious.

(2) *A cobra with upright fore body on a podium* — see Figure 5.68 (EB). Such symbols were used for both the winter and summer solstice points. Sometimes instead of cobra other symbols were placed on a podium. For example on the Round Denderah zodiac, there is a head of an animal with a disc over its head. However, if the podium is diagonally crossed out, or an animal on it has four heads, then it would be an equinox symbol. It is possible that Egyptian artists tried to associate with equinox points horizontally symmetric symbols and with solstice points figures manifesting vertical directions.

(3) *A fantastic creature resembling a bull with wings* — see Figure 5.68 (EM) and (BR). This animal is often portrayed with a lamb-head. Again, it's important that this animal has only one head. A four-headed animal would symbolize an equinox point. On the Small Esna zodiac (EM) such fantastic animals are placed vertically at the solstice points. Again, this position emphasizes the vertical direction. Such animals could equally be associated with the summer solstice point as well (see for example the Small Esna zodiac on Figure 2.17).

(4) *A falcon headed man stabbing with a spear a bull-like creature* — see Figure 5.68 (DL) and (OU). Notice that in all cases the bull-like animal has no front legs (only one rear leg is usually shown). This scene always appears only near the solstice points. Its meaning is unclear to us, but we can see that in some sense it was associated with a solstice point.

5.8.3 Symbols of the Spring Equinox in Pisces

The symbols used on the Egyptian zodiacs to describe the spring equinox point are shown on Figure 5.71. They are always located around Pisces. Let us describe them:

(1) *Rectangular plate with wavy lines*, the same as at the autumn equinox point. At the spring equinox such a table is present on the both Denderah zodiacs (see Figure 5.71 (DR) and (DL)).

(2) *Four-headed fantastic creature* with two pairs of heads facing opposite directions, which could be also be present at the autumn equinox point (see subsection 5.8.1). Such a figure is present at sthe pring equinox point on the Round Denderah and Brugsch's zodiacs (see Figure 5.71 (DR) and (BR)). It seems to be a rule that all four heads of this symbol look like lamb-heads.

(3) *A sequence of snakes (cobras)* with upright fore bodies, all looking in one direction. On the Round Denderah zodiac these snakes are placed on a podium (see Figure 5.71 (DR)). On the Inner Petosiris zodiac this sequence is located right above another fantastic symbol of an eye with spread wings and human legs (see Figure 5.71 (P2)).

(4) *A horizontally symmetric wavy snake with two heads with wings.* This symbol is present on the Small Esna zodiac, where one can also notice two little beetles in between

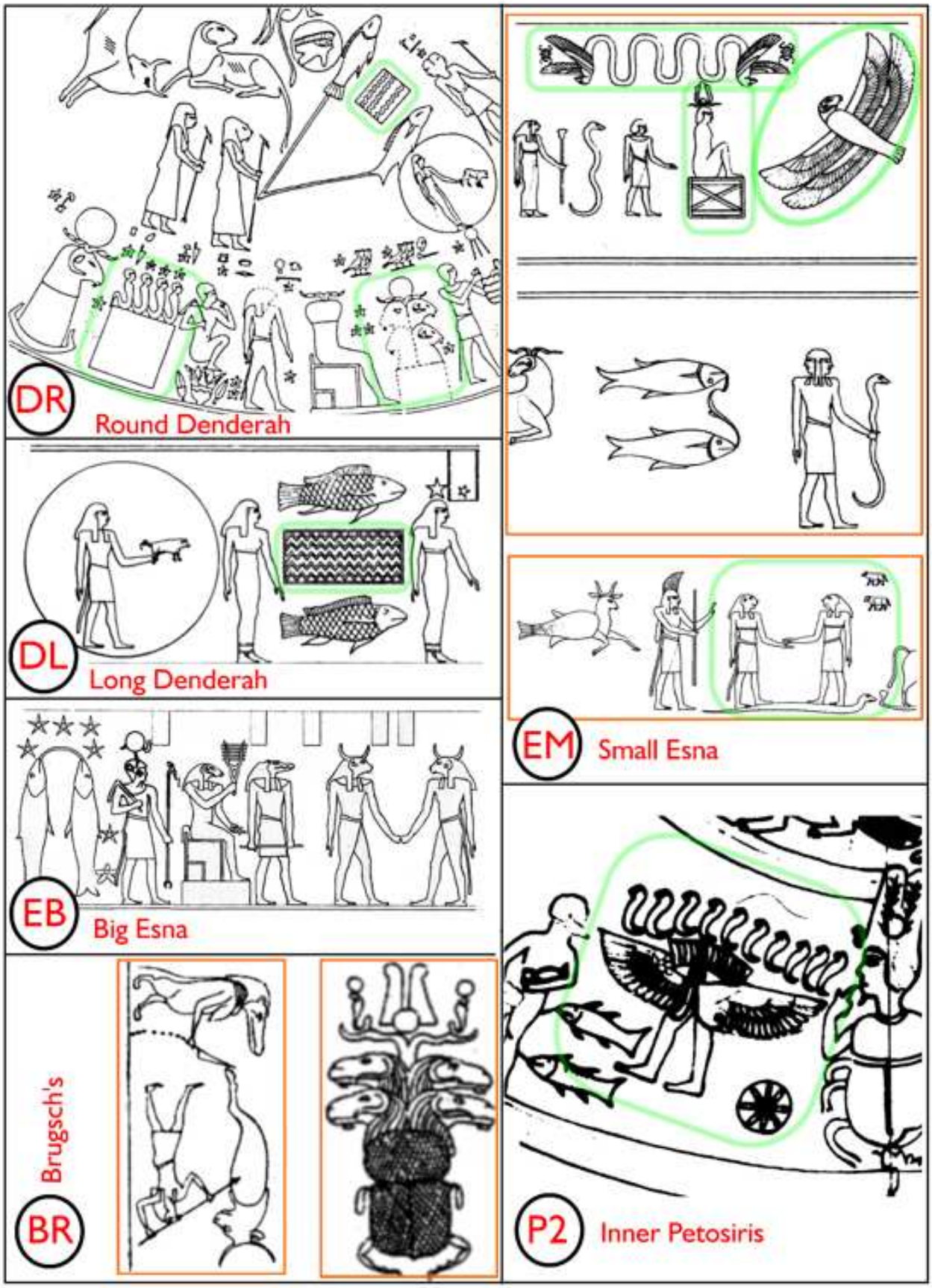

Figure 5.71: *Symbols of the spring equinox on different Egyptian zodiacs. In some cases these symbols are encircled by green contours to distinguish them from other symbols*

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the wings on each side (see Figure 5.71 (EM)). Such a symbol was also used at the autumn equinox point (see subsection 5.8.1).

(5) *A figure on a podium with a diagonal cross.* This symbol was also used at the autumn equinox point (see subsection 5.8.1). On the Small Esna zodiac at the two equinox points, one can find two such podiums with different figures on them (see Figure 5.71 (EM) and Figure 5.67 (EM)).

5.8.4 Symbols of the Summer Solstice in Gemini

The symbols of the summer solstice are presented on Figures 5.72, 5.73 and 5.74. Let us list them:

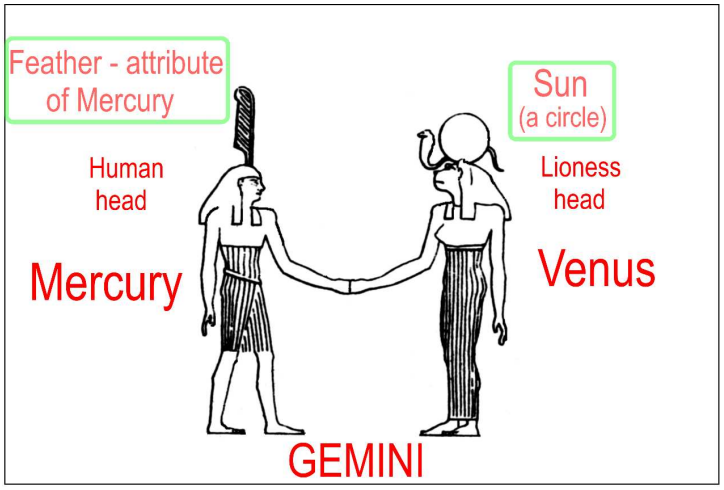

Figure 5.72: *The Egyptian astronomical hieroglyph of Gemini with a minimal partial horoscope of the summer solstice*

(1) Like in the case of Sagittarius, the symbol of Gemini on the most Egyptian zodiacs is a complex figure. Apart of Gemini itself it also includes the minimal partial horoscope of the summer solstice: the Sun, Mercury and Venus. This complex *astronomical hieroglyph* of Gemini is explained on Figure 5.72.

(2) *A man with a raised hand* (see Figures 5.73 and 5.74 (DL), (EM) and (AN)). Sometimes this figure is placed on a boat. In another hand he may hold a planetary walking stick indicating that this is a symbol of the Sun, which was considered as a planet in the ancient astronomy. As we already discussed this figure in section 4.2, his raised hand symbolizes the summer solstice. Such a figure never appears at the winter solstice point.
Let us point out that this figure of a man with a raised hand is wrongly interpreted by Egyptologists as a symbol

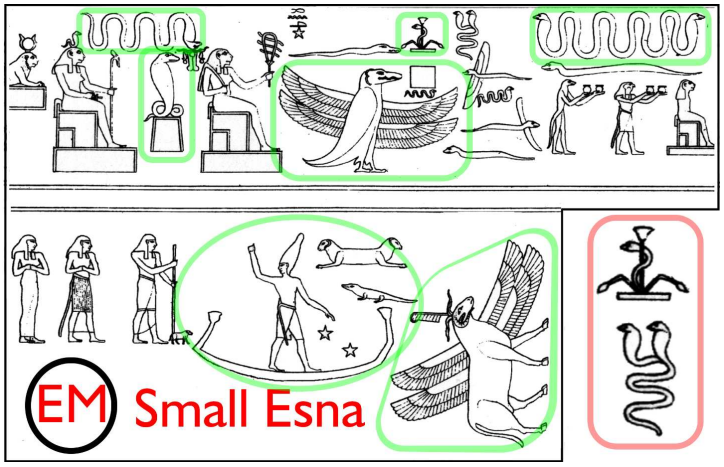

Figure 5.73: *The summer solstice symbols on the Small Esna zodiac with some details enlarged.*

of the non-zodiacal Orion constellation. On this basis a huge theory about the hidden meaning of the Egyptian astronomical texts was speculated. Even leading to a conjectured "dating" of Egyptian pyramids. See for example [36]. We do not intend to engage here into a dispute about these theories, but in view of our results it is clear that this symbol has nothing to do with the Orion constellation. There is no evidence that any other than zodiac constellations were ever displayed on the Egyptian zodiacs.

(3) *A bird sitting on a pillar.* This bird symbolizes the Sun at the summer solstice (see Figure 5.74 (DR) and (DL)). This figure appears only at the summer solstice point. We've already discussed this symbol in section 4.2.

(4) *A standing pillar with two bending poles on its sides.* This symbol, which is another variation of the previous one, expresses the idea of a local maximum. On the Egyptian zodiacs it can only be found around the summer solstice point. Sometimes the middle pillar was decorated with a snake around it (see Figures 5.73 and 5.74 (EM)).

(5) *A fantastic creature with bull's body, lamb's head and the wings* (see Figures 5.73 and 5.74 (EM)). Such a symbol also can be found at the winter solstice point (see subsection 5.8.3). A similar creature with four heads has another meaning — it denotes an equinox point (see subsections 5.8.1 and 5.8.3).

(6) *A fantastic bird with a lamb or crocodile head.* For example, on the both Esna zodiacs this figure has a crocodile head (see Figures 5.73 and 5.74 (EM) and (EB)) and on Brugsch's zodiac it has a lamb head.
This bird has additional pair of wings similar to the wings of the bull discussed above. On all the zodiacs that we studied, we found it only around the summer solstice point.

(7) *A wavy symmetric snake with two heads* (without wings). A similar snake with wings would represent an equinox point (see Figures 5.73 and 5.74 (EM) and (EB)).

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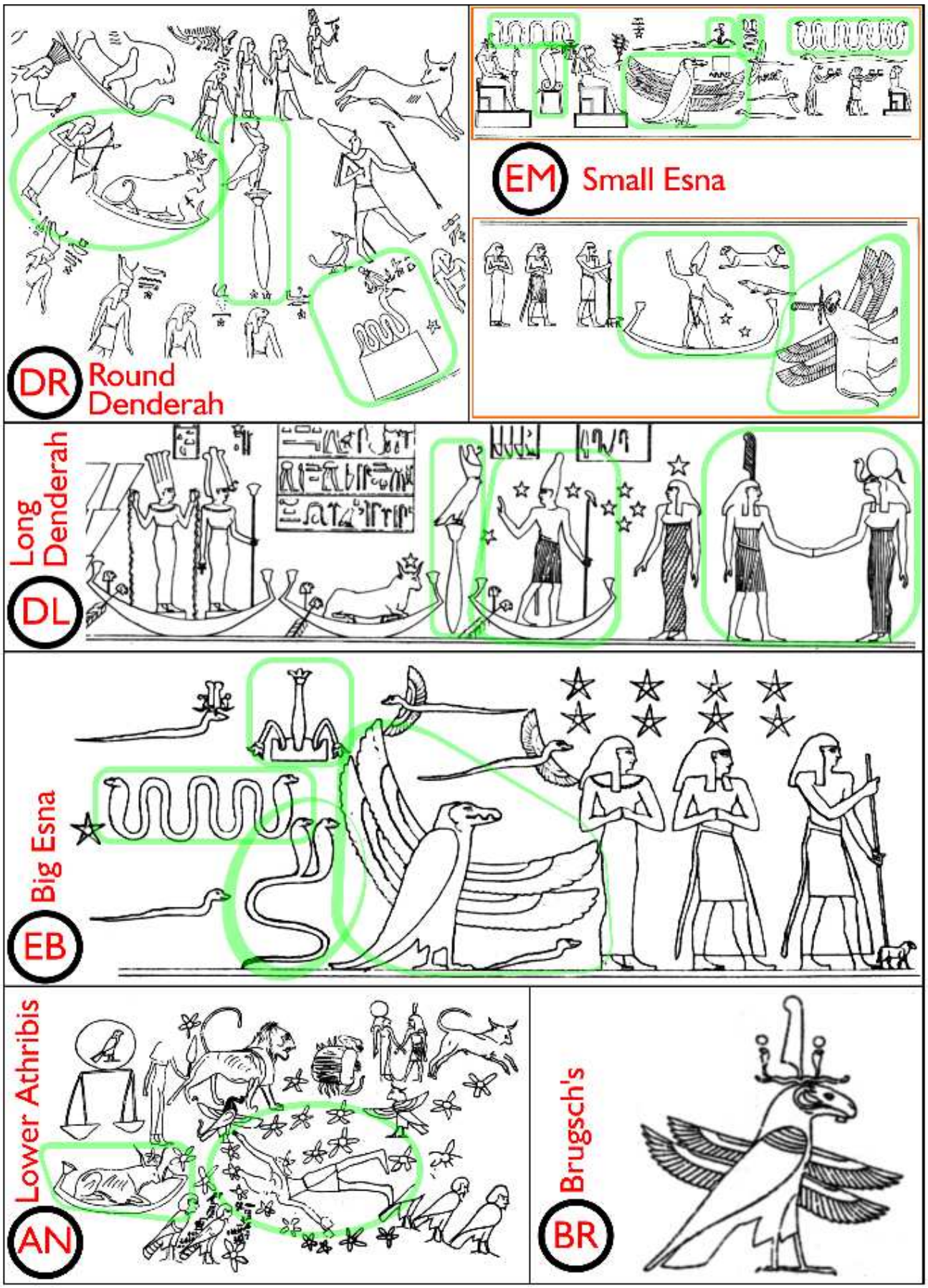

Figure 5.74: *Egyptian zodiacs. Some of these symbols are encircled by green contours to distinguish them from the other figures.*

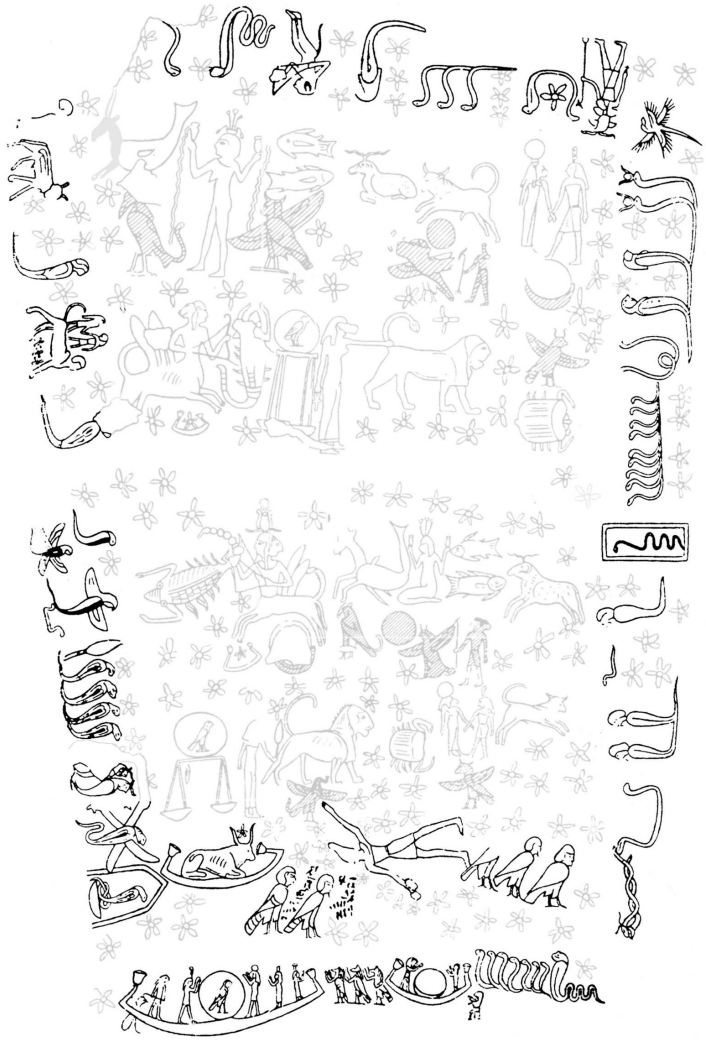

Figure 5.75: *The fringe of figures surrounding the two Athribis zodiacs with other symbols made dim.*

(8) *A two-headed cobra with upright fore body* (both heads on the same side) (see Figures 5.73 and 5.74 (EM) and (EB)).

We conclude this section with a picture of the fringe surrounding the two Athribis zodiacs (see Figure 5.75). This encircling arrangement of the figures is composed mainly of the equinox and solstice symbols described above. For example, there are several sequences of snakes, which usually occur at the spring equinox points. There are also two entwined snakes — a symbol of the equinox point (the most probably the autumn one), and a cobra on a small podium representing the summer solstice. The bottom part of the fringe is a partial horoscope of the summer solstice that we have discussed in subsection 5.5.3. Directly beneath, there is a symbolic scene, which will be discussed in the next section.

5.9 Supplementary Astronomical Symbols on Egyptian Zodiacs

On the Egyptian zodiacs, beside the symbols of the main and the partial horoscopes, constellations figures and the symbols of the solstice and equinox points, there are sometimes present other additional symbols or even symbolic scenes with definite astronomical meaning. In this section we describe some of them, for which we were able to understand at leasttheir meaning at least partially. Let us point out that only few such symbols can be found on the Egyptian zodiacs and most of them do not contain any significant information for the dating, but there are some exceptions. Nevertheless, understanding the meaning of these symbols is important for the decoding process of the general astronomical chart shown on a zodiac.

It is intriguing that one particular astronomical event found a special place on the Egyptian zodiacs. This was the first spring full-moon. In the medieval Christian tradition the date of Easter was calculated using the concept of so-called *paschal moon*, which is the first full moon that occurs after the spring equinox. The same concept of the paschal moon, but with different rules, were used in the Jewish tradition to determine the date of Passover. According to the conventional chronology the paschal moon has nothing to do with the ancient Egyptian tradition, however it is sometimes represented on the Egyptian zodiacs. Moreover, in some cases, this representation clearly indicates a strong link with the Christian Easter.

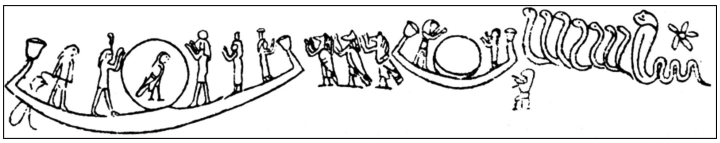

Figure 5.76: *A representation of the paschal moon procession on the Athribis zodiacs*

5.9.1 Paschal Moon

Let us look at the symbolic scene, shown of Figure 5.76, at the bottom of the Athribis zodiacs (see Figure 5.75). In view of the already decoded symbolism on the Egyptian zodiacs, the meaning of this scene is not difficult to understand. We read it from the right to left, as it is indicated by the direction of the procession.

At the right end of this procession, we see a familiar symbol of the spring equinox, which is the sequence of the snakes with upright fore bodies (see subsection 5.8.3). Next to the left, there is a boat carrying a disk with a narrow crescent. Two human attendants stand on its both sides facing it. This is a symbol of the first new moon, which was “born” after the

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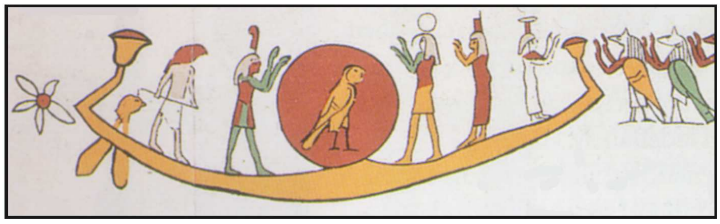

Figure 5.77: *A representation of the paschal moon on the Athribis zodiacs*

spring equinox. In fourteen days it will become the full moon, which is symbolized by a disk on the next boat (see Figure 5.77). This time there is no crescent marked on the disk, but only a bird, which symbolizes the Sun. It is astronomically correct picture indicating that the whole enlightened by the Sun hemisphere of Moon was visible. In this way, what is represented on this picture is the first full moon after the spring equinox, which is the paschal full-moon. Notice that the boats on this picture were not used for artistic reasons only, but they are the *pull-out* symbols with a definite astronomical connotation. They signalize that the planetary figures placed on them are not connected to the main horoscope (*time pull-out*) and possibly they do not refer to the nearby constellations (*space pull-out*).

The same symbol of paschal full moon, in a form of a disk with a bird inside, is also shown on each of the Athribis zodiacs, in the both cases in Libra (see Figure 2.19). Is it just accidental that on the both zodiacs, referring to different years, the paschal full moon occurred in Libra? But, this was not a coincidence.

As a matter of fact, during the last two thousand years the paschal full-moon always occurred in Libra or near it. In order to explain it, first we find the Sun position on this day, which is a relatively easy task. As we already know, that at the spring equinox the Sun was located in Pisces, and the full moon occurs after fifteen days from the beginning of the new moon cycle. For the paschal full moon, in half of the cases, its new moon appeared within two weeks after the spring equinox, and in the other half, within two weeks before it. That means that the paschal full moon always occurs form one to thirty days after the spring equinox. That means that during the last two thousand years the Sun could only be located around Aries (in most cases inside Aries).

Consequently, the position of the paschal full moon should be in Libra or nearby in a neighboring constellation. Indeed, at the time of full moon the Moon is on the side of the Earth opposite to the Sun, i.e. for an observer on the Earth, it is on the side of the ecliptic opposite to the Sun.

It was already noticed by Morozov, that on the Egyptian zodiacs there is often a disk shown in Libra. Now, we

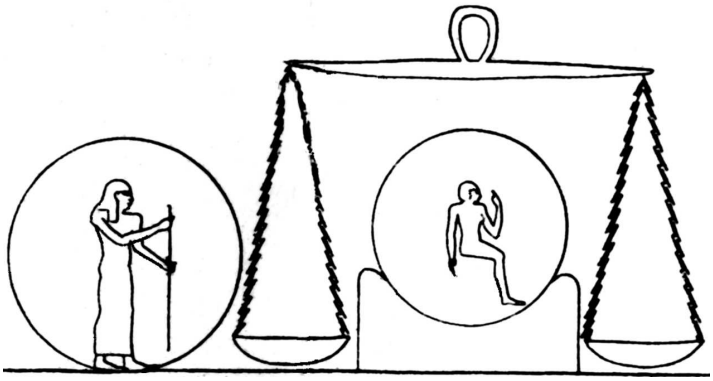

Figure 5.78: *Representation in Libra of the paschal moon and Moon in the main horoscope on the Long Denderah zodiac.*

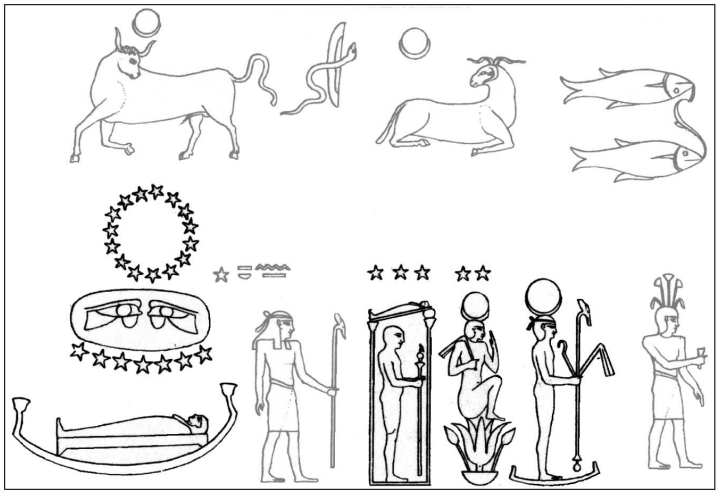

Figure 5.79: *Representation of the paschal moon and the seven day resurrection associated with fifteen days (full) moon.*

can explain it as a representation of the paschal full moon[50]. Sometimes, in exceptional cases, this disk could denote Moon in the main horoscope, but only when its date was exactly the date of the paschal full moon. Such an example is the Round Denderah zodiac (see Chapter 7). On the other hand, on the Long Denderah zodiac there are two moon disks shown in Libra — one for the main horoscope (which means that Moon was in Libra on the main date) and another one to denote the paschal moon. It is interesting, but not surprising, that in the case when there was a full moon in Libra in the main horoscope, which was not paschal, the Egyptian artist placed two different circles in Libra (see Figure 5.78).

Another, even more intriguing, example of the paschal moon representation we find on the Small Esna zodiac (see Figure 5.79). Notice that under the Aries and Pisces constellation there are two human figures with crescents and disks over their heads. Both of them are placed on pull-out symbols. One of them is a familiar symbol of a new moon, which

[50] See [4], Vol. 6, p. 697.

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is the sitting child with a hand near its mouth (a baby sucking a finger?). The second figure is standing with a planetary walking stick in its hand. That means we are again dealing here with a representation of two subsequent moon phases: the new moon and the full moon.

Figure 5.80: *Egyptian painting of the resurrection of Osiris with two eyes above his head.* (Taken from [116], p. 168)

The usage of the pull-out symbols made it possible that these two stages of Moon are shown together (notice that the new and full moons appear on the opposite sides of the ecliptic). Two stars over the child symbol of the new moon could indicate that its age is two days, and indeed the new moon appears exactly two days later after its disappearance. But the most interesting symbols related to this paschal moon representation are located in the extension of this scene under Taurus. The sequence of these figures is interrupted by a male figure from the main horoscope holding a walking stick. Behind it, there is a big boat (a pull-out symbol) with a scene symbolizing the resurrection of Osiris accompanied by seven stars and a circle made of fifteen stars. Inside the boat there is a sarcophagus with a dead body and the symbol of two eyes above it indicate that this body belong to Osiris who is going to be resurrected[51].

We present on Figure 5.80 an Egyptian painting illustrating the resurrection of Osiris. Notice the presence of two eyes, similar to those on the Small Esna zodiac (see Figure 5.79). The difference between these two pictures is that here the mummy of Osiris is already resurrected and standing, while on the Esna zodiac it is still lying down prior to its resurrection. Moreover, there are two numbers associated with the scene of the resurrection on the Esna zodiac, namely 15 and 7. Notice above the eyes a disk made up of 15 stars and under them a sequence of 7 stars. These are all the symbols related to this scene.

On the other hand, let us recall the rules of the date determination for Easter Holiday of Jesus Christ's resurrection. Ester is a seven day holiday starting on the first Sunday after the fifteen days (i.e. full) moon following the spring equinox. It is not difficult to realize that this scene of Osiris resurrection is fully parallel to the description of Easter date. First of all, the whole scene begins exactly under the Pisces at the spring equinox point with the new and full moons. Notice that the standing figure with a disk on its head (see Figure 5.79) holds also, beside of the walking stick, two attributes of Osiris (see Figure 5.80), which clearly connect it with the resurrection of Osiris scene. Moreover, the circle made of 15 stars is a perfect symbol for a 15 day full moon (notice that the lunar cycle is almost 30 days and a full moon occurs on 15 day of this cycle). Finally, Ester holiday is determined based on concept of a seven day week and lasts seven days.

This symbolism agrees well with the actual date encoded in this zodiac. It was proved by our computations that this date was May 6-8, 1404 AD, which indicates the late Middle Ages and the epoch of Christianity (see Chapter 7).

5.9.2 Bird-Sun on the Long Denderah Zodiac

On the Long Denderah zodiac one can see the same bird appearing in several different places, which look like short stops on its way along the zodiac. The bird symbolizes the Sun moving around the zodiac during its yearly itinerary. There are six such places:

1. Right above the second decan in Virgo (see Figure 5.59) in a partial horoscope of the autumn equinox. Here, the bird indicates the location of the partial horoscope as well as the moment when the Sun passed the autumn equinox point.
2. Between Scorpio and Sagittarius next to the figure of a wolf standing on a scythe (see Figures 3.7, 5.22 and 5.9). We will discuss this symbol in subsection 5.9.6. Here, the bird wears a high hat.
3. On the top of the wing of Sagittarius. Here, it indicates the Sun passing through the winter solstice point (see Figures 3.7, 5.22 and 5.9).
4. Right above the first decan of Sagittarius, which precedes the scene of slaughter of a bull with one leg (see Figures 3.7, 5.22 and 5.9). Here, the bird with horns is again a part of the partial horoscope of winter solstice, this time indicating the presence of some elements of this horoscope in Capricorn.

[51] See [10] (p. 68) and [7] (p. 2).

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5. Right behind Venus on the head of one of two animals sitting back to back. Here, it also wears a tall hat. According to Morozov these two animals symbolize two twilights (the sunrise and sunset). This symbol appears near Venus, which is morning/evening planet, on both Denderah zodiacs. In this case the bird-sun is a part of this symbol.
6. On the top of a column following the constellation of Gemini. Here, it is a part of the summer solstice symbol (see Figure 4.2) and clearly indicates the passage of the Sun through the summer solstice point.

One can ask a question why there is no such bird near the spring equinox point, which is one of the main points on the ecliptic in the ancient as well as in modern astronomy. Notice that there is already a big circle symbolizing the Sun at this location (see Chapter 7).

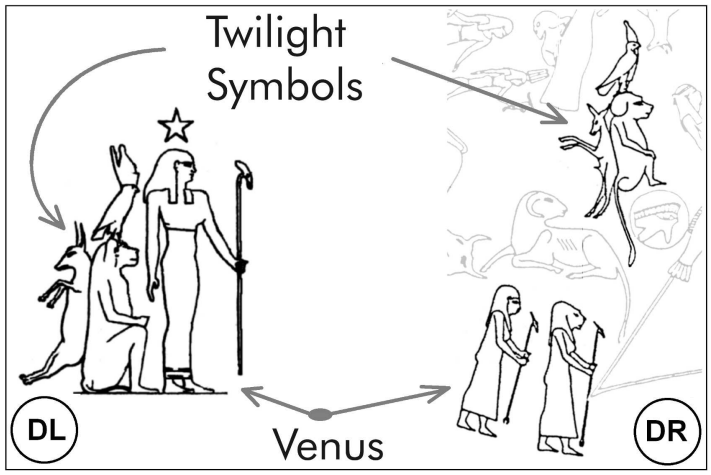

Figure 5.81: *A figure of two back-to-back animals on the Long (on the left) and Round (on the right) Denderah zodiacs.*

5.9.3 Symbol of the Twilights

According to N.A. Morozov[52], the figure of two back-to-back animals symbolizes on Egyptian zodiacs the morning and evening twilights. This figure appears near Venus on the main horoscope on the both Denderah zodiacs (see Figure 5.81).

It is clear why this symbol is associated with Venus, which was considered to be a morning and evening star so the twilight figure seems to be a natural companion for it.

5.9.4 Beheading Scenes near Aquarius

On the both Denderah zodiacs, near the figure of Aquarius we can see a scene of beheading. This scene, on the Long Denderah zodiac, is located on the right from Aquarius. There is a man grasping an animal by ears while getting ready to cut its throat with a knife that he holds in another hand. Notice a beheaded human figure standing behind that man. On the Round Denderah zodiac, next to a similar scene, there is an already beheaded animal (see Figure 5.82).

[52] See [4], Vol. 6, p.667.

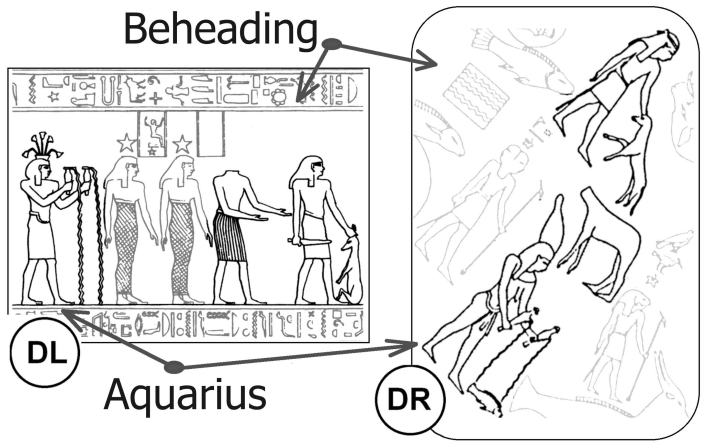

Figure 5.82: *A scene of beheading on the Long (on the left) and Round (on the right) Denderah zodiacs.*

Probably, as we already mentioned it in subsection 5.1.11, this scene depicts in a symbolic way the severed head of John the Baptist.

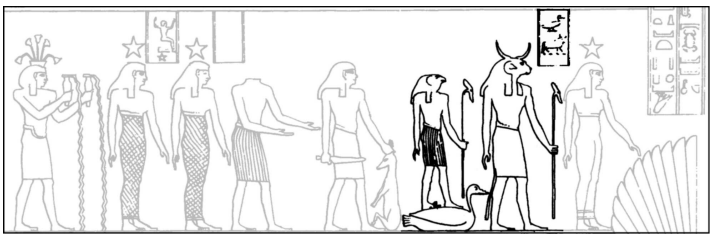

Figure 5.83: *Mars meeting Saturn on the Long Denderah zodiac.*

5.9.5 Meeting of Saturn and Mars on the Long Denderah Zodiac.

On the Long Denderah zodiac, next to the beheading scene, there is a figure of Mars with a planetary walking stick standing on a goose preceded by Saturn in the main horoscope — a figure with a planetary stick and a crescent on its head (see Figure 5.83). Clearly, the goose is here a *pull-out* symbol indicating that Mars appears here not in the main horoscope. On the other hand, a goose appears as an attribute of Mars on several Egyptian zodiacs, so using it as a *pull-out* symbol for Mars seems to be logical. It is the most probable that this combination of symbols refers to a meeting of Mars and Saturn that took place some time during that year. But this information is not very useful for the dating purposes. In fact,

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because Saturn moves very slowly, while Mars is moving relatively fast, such meeting occurs every year and it is always near the location of Saturn on the main date (whenever it was). Nevertheless, in order to assure the correctness of the dating process, it is important to understand all the symbols, in particular, the planetary symbols appearing on the Egyptian zodiacs even if they do not produce any new information.

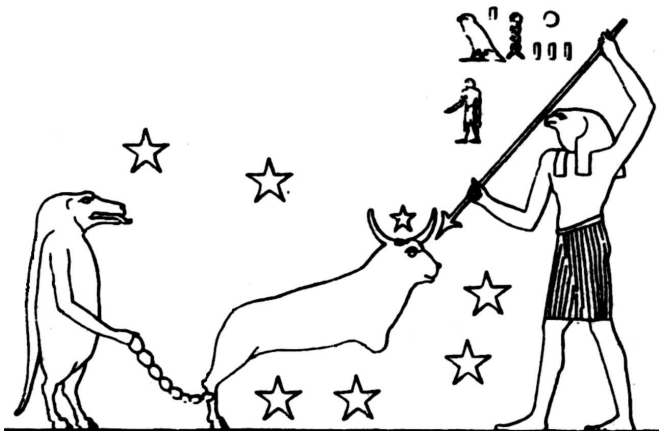

Figure 5.84: *Bullfighting scene on the Long Denderah zodiac.*

5.9.6 Stabbing of a Bull (Bullfighting)

On Figure 5.84 we show a scene of killing a bull, in which a man with a falcon head trusts a long spear at a one-legged bull. We already mentioned this scene in subsection 5.8.2 in the context of the partial horoscope of the winter solstice.

It is not clear what is the meaning of this symbolism but we should indicate that bullfighting, which this scene strongly resembles, was common in Europe during the medieval times. It existed in the Imperial Rome and is still present in Spain as a form of entertainment. From this point of view, knowing the actual date of the zodiac, it is not surprising to see such scenes on the Egyptian zodiacs. In fact, it is possible that corrida, which is a popular spectacle in Spain, represents remains of a wide-spread tradition that was also portrayed on Egyptian zodiacs.

5.9.7 Wolf on a Scythe

On Figure 5.85 we present a symbol of a wolf (or a dog) on a scythe, which appears on the both Denderah zodiacs. On the Long Denderah zodiac it is located between Sagittarius and Scorpio and on the Round Denderah zodiac, it can be found in the center of the zodiac circle at the approximate area of the ecliptic and celestial poles. Again, we are not sure about the meaning of this symbol.

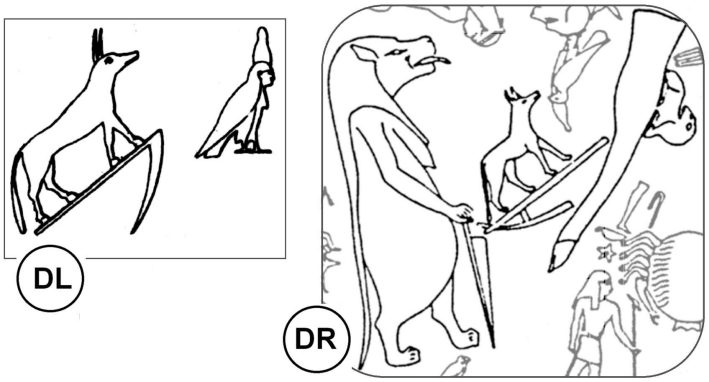

Figure 5.85: *Two scenes with a wolf on a scythe on the Long (on the left) and Round (on the right) Denderah zodiacs.*

5.10 The Places of Astronomical Observations: Cairo and Luxor

Visibility of planets close to the Sun may vary depending on the location, where the astronomical observations take place. Let us recall that on the Egyptian zodiacs the visibility of some planets are indicated and this information should be verified for the astronomical solutions. In certain cases the location of the observer is essential. We choose Cairo in Egypt as a standard location for the observer, but is certain particular cases, we also checked the visibility in Luxor. As Luxor is located about 500 km to the south from Cairo, it was possible that an observer in Luxor could still see some close to the Sun planets, while they weren't visible in Cairo. Since Denderah, Esna, the Valley of the Kings, are all located in proximity of Luxor (Thebes), it should be assumed that the original location of the observer could also be in this area.

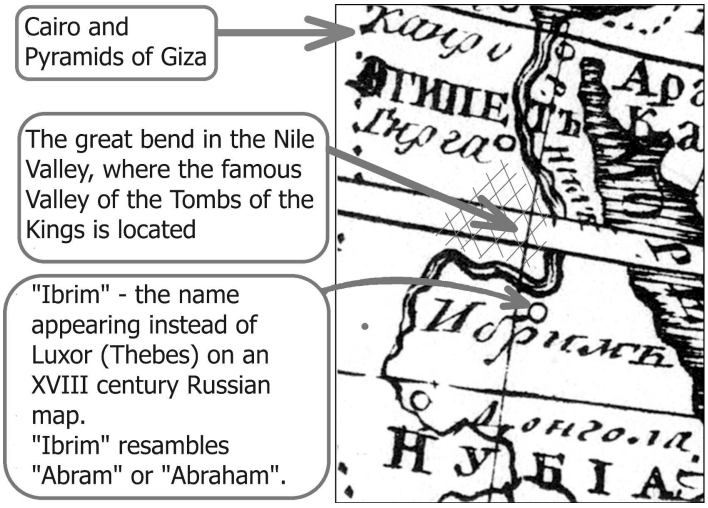

Figure 5.86: *A fragment of an old 18th century Russian map showing the city of Ibrim at the location of Luxor.*

Egyptologists consider Luxor to be located at the place of ancient Thebes. Nevertheless, on some old maps instead of Luxor there is another name indicated, namely Ibrim (see [3]). On Figure 5.86 we present a fragment of an 18th century Russian map, showing the region of Egypt with the name Ibrim clearly written instead of Luxor. The name *Ibrim* resembles *Abram* or *Abraham*. Actually, the Arabic equivalent of the name *Abraham* is *Ibrahim*, so this city or another place nearby possibly was named after Abraham. Since the dates of all the Egyptian zodiacs turned out to be medieval, the existence of a city with such a biblical name near the Valley of the Kings is not surprising. In fact, there is some symbolic link connecting the Kings burial grounds with the biblical patriarch Abraham, which is the ancestral character of this place.

5.11 Beginning of the Year on the Egyptian Zodiacs

As we already explained, a typical ancient Egyptian zodiac is an astronomical representation of the whole year containing the main date. Therefore, it is essential to clarify when the beginning of the year was assumed to take place. Nowadays, the new year starts on January 1st, but in old times there were many different conventions concerning the beginning of the year. For example, year could start in March, September (what was very common in the middle ages) or another month. Consequently, we have to answer the question, when in the ancient Egyptian tradition the new year was beginning?

In order to tackle this problem we need to examine the structure of the available to us Egyptian zodiacs. On most of them, it appears that the beginning of the year was taking place in September. Let us consider first the rectangular zodiacs, i.e. the Long Denderah, Big and Small Esna zodiacs. For example, on the Small Esna zodiac (see Figure 2.17) the constellations and planets are shown in a form of a one long procession. beginning in Virgo Although the beginning of the zodiac was destroyed, from the remaining parts we can deduct that it was Virgo, i.e. the new year was taking place in September. In the case of the Long Denderah (see Figure 2.8) and Big Esna (see Figure 2.15) zodiacs, this situation is more complicated. Each of these zodiacs is divided into two parts, for each one of them we have two possible variants for the starting point of the procession, and consequently, for the beginning of the year. On the Long zodiac the procession begins either in Leo or Aquarius, but taking into account that additional Virgo is a part of Leo symbol (see subsection 5.1.5), the beginning of the year could also take place in Virgo. On the Big Esna zodiac the first constellation could be either Virgo, Leo or Pisces (see Figure 2.15). In summary, we can conclude that the first constellation on these rectangular zodiac was most probably Virgo. In other words, according to these zodiacs, the Egyptian year began in September. This conclusion does not contradicts the information provided by other zodiacs, except possibly the Athribis zodiacs (we will discuss this case later in Chapter 8).

It turns out that our conjecture about the beginning of the Egyptian year in September, which was made purely based on the evidence from the zodiacs, agrees with the particularities of the Egyptian climate. It was pointed out by N.A. Morozov that periodic Nile floods, which culminate in September, are related to the beginning of the new agricultural season, so from this point of view the choice of September as the beginning of the new year was natural in Egypt.[53]

Consequently, during the Egyptian year the equinoxes and solstices were appearing in the following order:

1. *Autumn Equinox* in September (at the beginning of the new year);
2. *Winter Solstice* in December;
3. *Spring Equinox* in March;
4. *Summer Solstice* in June (at the end of the year).

In our computation, we didn't assume as a requirement that the Egyptian year began in September. In fact all possibilities were taken into account and the information provided by the partial horoscopes was verified for all considered variants. Nevertheless, in all the cases, with the only exception of the Athribis zodiacs, we've obtain a confirmation that indeed the Egyptian year started in September.

[53] See [4], Vol. 6, p. 641.

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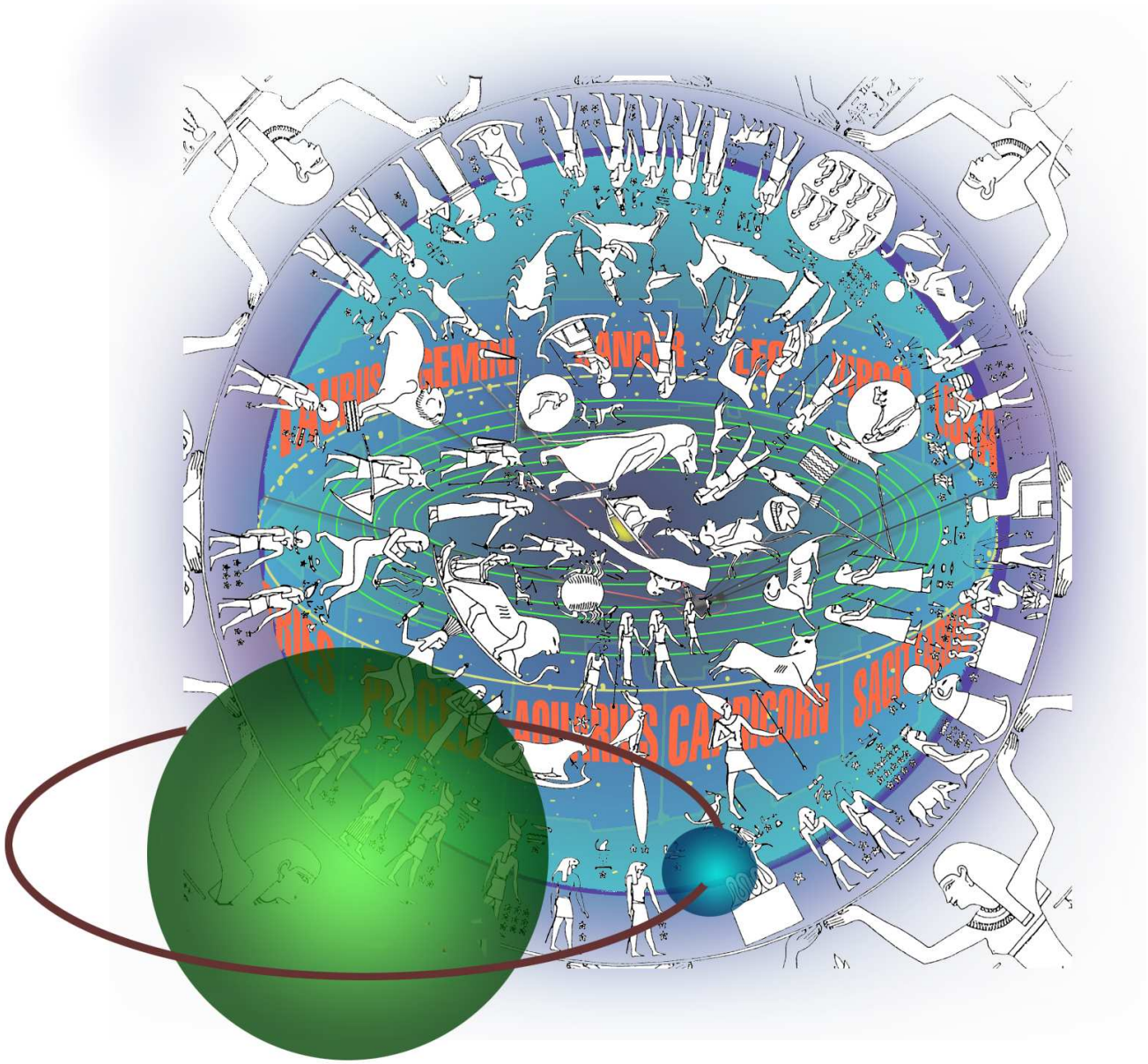
Chapter 6

Method of Astronomical Determination of the Dates Encoded in Egyptian Zodiacs



6.1 Seven Planets of Ancient Astronomy: Zodiacs and Horoscopes

In today's astronomy there are the nine major planets known to revolve around the Sun: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto, among which the first five had been visible in the sky to the naked eye since ancient times. In old times Uranus, Neptune and Pluto were unknown. Uranus was discovered in 1781 by the English astronomer William Herschel. Neptune is the only giant gaseous planet that is not visible without a telescope. It was discovered in 1846 by John C. Adams and Urbain-Jean-Joseph Le Verrier. Pluto was found in 1930 by Clyde Tombaugh.

In primitive astronomy the term planet was applied to the seven celestial bodies that were observed to move appreciably against the background of the apparently fixed stars. These included the Sun and Moon, as well as the five true planets (Mercury, Venus, Mars, Jupiter, and Saturn). Let us explain that until the heliocentric theory of Copernicus was established in the 16th century, the Sun and Moon were also considered as planets. Before that time it was a common believe that all the celestial bodies revolved around the Earth. For an observer on the Earth, the trajectory of the Sun or Moon looked the same as trajectories of the real planets and they were also treated to be the same.

Probably, at the early stage of the astronomical knowledge people thought that the Earth was surrounded by a gigantic sphere, which we call today the *celestial sphere*, covered by immobile stars. On this sphere there were also visible moving lights of the Sun, Moon, Jupiter, Saturn, Mercury, Mars and Venus. After long observations the ancient astronomers realized that all these lights move on the celestial sphere following the same imaginary path in proximity of a large circle. They had impression that this path was always staying unchanged. In fact, this is not true, but the changes that take place are so slow that it is impossible to observe them with a naked eye only. This path among the stars on the celestial sphere is called the *ecliptic* or *zodiacal belt*. The star constellations placed along the ecliptic are called the *zodiacal constellations*.

In this way, the creators of the Egyptian zodiacs believed that on the sphere filled with immobile stars, on the path along the zodiacal belt, there were seven slowly moving planets. These seven *moving stars*, like they were used to be called in the old times, were the **Sun, Moon, Jupiter, Saturn, Mercury, Mars**, and **Venus**. This practice to include among the planets also the Sun and Moon, lasted for a very long time. On Figure 6.1, we show a page from an 18th century Russian calendar, where the Sun and Moon are still listed among planets.

All these planets, except the Sun and Moon, can only be visible at night, when the overwhelming brightness of the Sun is absent. On the other hand, the Sun is visible only during the day, while Moon is visible by night, but sometimes also in the daylight. Moreover, at any moment of the time each of the seven planets of antiquity is located in one of the zodiacal constellations. The arraignment of these seven planets among the zodiac constellations is called a *horoscope*.

Egyptian zodiacs are old Egyptian representations of the zodiacal constellations on the sky, shown in a symbolic form. Often, beside the zodiacal constellations there were also shown the planets, which in such case were describing a horoscope. Moreover, as we discussed it in the previous chapters, on an Egyptian zodiac other additional symbols could also be included. There is usually only one complete horoscope on an Egyptian zodiac, but sometimes there are more than one, or no horoscope at all.

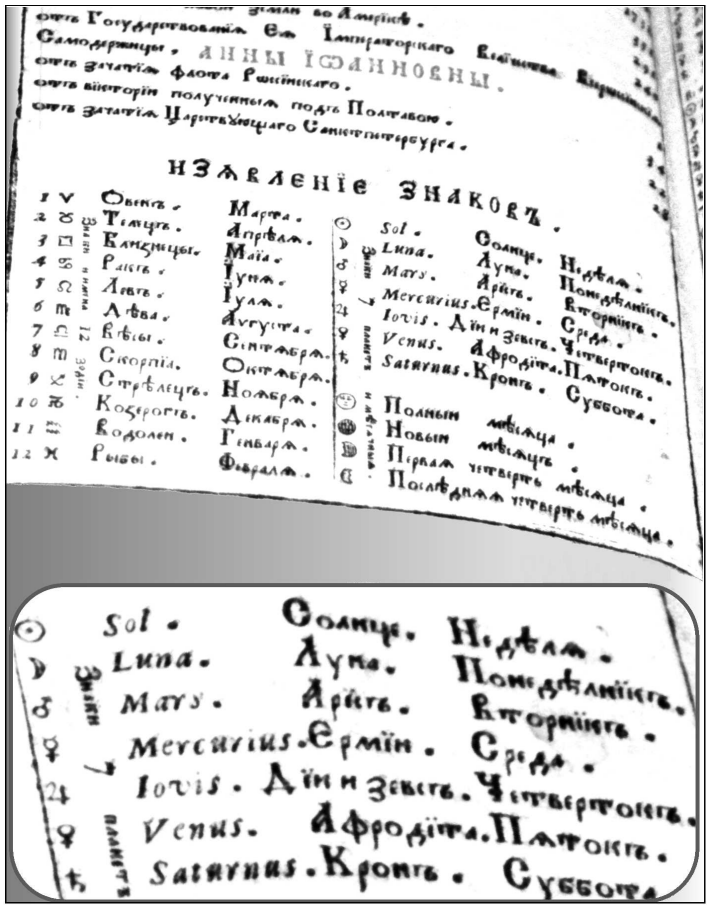


Figure 6.1: *A page from an eighteenth century Russian calendar, from the time of Empress Anna Ivanovna (1730-1740). On the enlarged fragment the Sun and Moon are listed among the seven planets.*

For all the planets, with the exception of the Sun, their positions among the zodiacal constellations can be usually determined by direct observation of the sky. At night the planets and the stars are visible together on the sky. Only those planets, which are too close to the Sun, can not be observed at night, and of course they are not visible at the daylight either.

However, still it is possible to determine their position on the zodiacal belt — they are simply located in the same place as the Sun.

Since the stars are not visible when the Sun is in the sky, there are some indirect ways to determine its precise location among them. For example, just after sunset, when it's already dark enough, it is possible to recognize the zodiacal constellation appearing at the location where the Sun was last seen on the horizon. Then, by estimating at this moment the Sun's submersion under the horizon, its distance from the Sun can be approximated. For this purpose, we need to know the speed of the Sun in its apparent motion on the sky, which is related to the eastward rotation of the Earth on its axis. The Earth's angular velocity doesn't change in time (within the limits of the required by us precision), hence the calculation of the submersion of the Sun is rather simple, but still is depended on some kind of a time measuring device.

There is another method to quite precisely determine the position of the Sun among the constellations, but this method could only be applied on specific days, namely at the time of Full Moon, and under the assumptions that the lengths of the zodiac constellations were already measured and compiled into a catalogue. With a help of such a catalogue, an ancient astronomer could determine the position of the Sun based on the position of Moon. More precisely, at Full Moon the location of the Sun on the ecliptic is exactly at the point on the opposite from Moon side of the Earth. Therefore, by direct observations the position of Moon could be established, and next the location of the Sun, at the opposite point on the ecliptic, could be determined based on the data in the catalogue. Knowing the Sun positions at the Full Moon days and using the fact that it moves on the ecliptic with constant velocity making a complete revolution in one year, it is possible to calculate the Sun's position on the sky on any day. Clearly this task could only be achieved with help of a device for measuring time and ability to carry on calculations with fractions, which were accomplished only in the middle ages[1].

Let us point out, that regardless of the astronomical observations, since the Sun and the stars could never be observed together at the same time, the position of the Sun among the star constellations could only be **computed**. We should also notice that on the Egyptian zodiacs the position of the Sun seems usually to be precisely specified, what indicated that they could not be created based only on the observations of the sky, without any astronomical computations.

6.2 Calculated Horoscopes on the Egyptian Zodiacs

As we already explained, the ancient astronomers were able to determine by direct observations the positions of all the planets except the Sun. The position of the Sun was either calculated or roughly estimated. Consequently, the horoscopes on the old zodiacs could be created as a result of direct observations. On the other hand, there was nothing to prevent the ancient astronomers from actually **computing** one or another horoscope. For this purpose, they needed a kind of astronomical theory, which would allowed them to roughly compute positions of all the planets, not only just the Sun's position. High precision of such a theory was not really important, a margin of an error from 5^o to 6^o would be completely sufficient for the computation of the planetary positions. This precision would be high enough to determine the locations of the planets with respect to the zodiacal constellations. For example, the geocentric theory of Ptolemy, which was presented in the presumable "ancient" *Almagest*, was more than sufficient for such purposes. Let mention that it is believed that *Almagest* was written in Egypt, in Alexandria[2]

Let us recall that the *Almagest* was an astronomical and mathematical encyclopedia, which according to the conventional chronology was compiled about AD 140 by Ptolemy (Claudius Ptolemaeus of Alexandria) (see section **??**). However, it was proved in the monograph [106] that this dating of the *Almagest* is wrong, and in fact it belongs to the epoch from the 7th to 14th century, with editorial modifications made up to the 17th century.

In this way, in any case, regardless if we trust or not Scaliger's chronology, we see that the Egyptian astronomers disposed of an astronomical theory completely sufficient to compute, and not only observe, the astronomical data for the horoscopes, which we find on the zodiacs.

This leads us to the following important statement:

A horoscope shown on an Egyptian zodiac does not necessarily refer to a date coinciding with the time of the creation of that zodiac.

For example, if a zodiac is a part of a ceiling in an old temple, then encoded in its horoscope date may be related to the time of the construction of the temple, but more likely it is a date of a significant event to which this temple was dedicated. In this case, it is most probable, that such a horoscope was **computed** at the time of the construction based on the information about the commemorated event.

There is also another possibility. The "ancient" creators of the zodiacs, who, as we will see, possibly lived in the 15th or even 16th century A.D., could have access to old books with astronomical records. These not existing anymore books could contain descriptions of astronomical observations from the 11th to 13th century, which were used by them to design zodiacs in the "ancient" Egyptian temples. They could also have an access to an earlier version of the Ptolemy's *Almagest* from the 11th to 14th century A.D. Today, we only have its European edition from the 17th century, which pretends to be the original version that survived till our present time from the ancient times. For more information we refer the interested reader to the monograph "Astronomical Anal-

[1] See [173], p. 94-102

[2] See [22].

ysis of Chronology," by Fomenko, Kalashnikov and Nosovsky (see [173]).

On the other hand, a horoscope painted on a cover of an Egyptian sarcophagus or on a tomb, is the most likely describing the date of death or birth of the buried there person. So, in this case it would also be an approximate date of the creation the sarcophagus or tomb. In such situations, a horoscope was probably determined by direct observations of the sky, with exception for the Sun. Since at that time, not too many computations were needed to find out a position of the Sun, it was presumably the most likely way the horoscopes were made. However, we should not exclude the possibility that in a tomb of a prominent individual there could also be a zodiac commemorating his or her date of birth or death, but another date of an important event related to this person. For example, it could be even an event in which predecessors of this individual took part. Therefore, zodiacs with calculated horoscopes could also be created for tombs. Clearly, such zodiacs referring to the long passed events couldn't be compiled using simple observations of the night sky only. It could be done by qualified astronomers who were able carry out the calculations for such a horoscope. Of course, the early chronologists could be mistaken in their ideas about the dates of the past events. Such mistakes were made before and are still done today, but it was always more likely that the dates were made rather older than younger. Longer was history of a family, a tribe, or a nation, more respect it had. In this way, we should expect that even in very old tombs it is possible to find calculated horoscopes indicating ancient dates that are false.

On the other hand, it is impossible to imagine that on a ceiling of a temple or inside a tomb, there could be commemorated **dates from the future**! Therefore, the construction date of a temple or a tomb should be considered to be **later** than the date encoded in the horoscope found inside it.

6.3 Movement of Planets Among Zodiac Constellations

Before we explain how with a help of a horoscope, it is possible to record in a unique, or almost unique way, a date of an event, we will recall some basic facts from astronomy.

When observing the night sky, we have an impression that we are surrounded by an imaginary sphere (called *celestial sphere*) extending outward from the Earth for an infinite distance and whose surface is filled with fixed stars. It is not difficult to notice that this sphere appears to rotate slowly. Today we know that this effect is created by the rotation of the Earth around its axis, around which the celestial sphere also seems to revolve. However, for the early astronomers the Earth was in the center of the universe surrounded by this slowly revolving celestial sphere on which the stars seem to be fixed. The term *celestial sphere* is still used in the modern astronomy in spite of the fact that it doesn't exist! Nevertheless, it is convenient for the astronomical analysis of the observable planetary motions and it also is used to make the astronomical maps, or *sky charts* showing the configurations of celestial bodies on the sky in the way how they are exactly seen by an Earth-based observer.

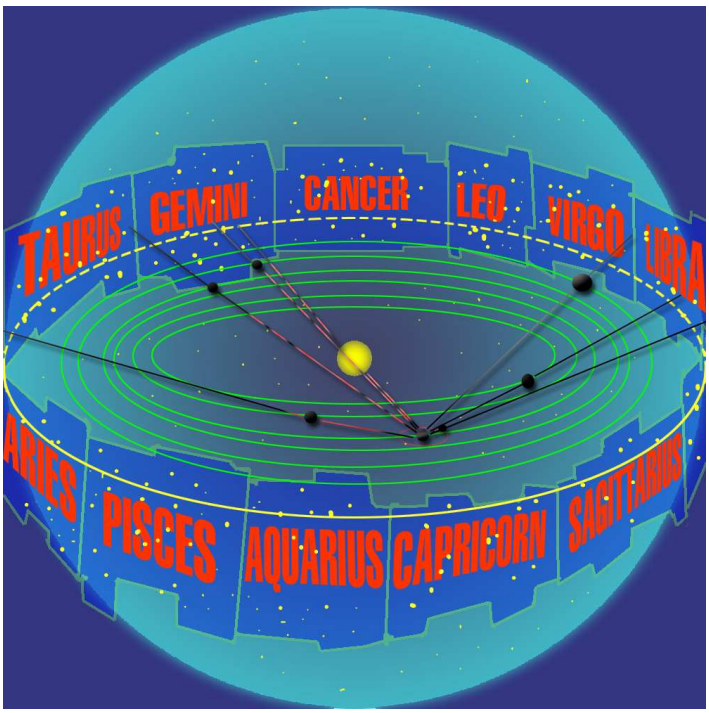


Figure 5.2
The Solar system shown inside the celestial sphere. The observed position of planets on the celestial sphere indicated by the rays from the Earth.

In fact, the actual distance from the Earth to all the stars (except the Sun) is so large in comparison to the size of the Solar system, that it can be assumed to be infinite or, what would result in the same, that all the stars are equally (but enormously) far from the Earth. Therefore, we can imagine that all the stars are indeed placed on a surface of a huge sphere (of an "infinite" radius) with the center at the Earth. On the other hand, since the distance from the Earth to the stars is incomparably larger that the distance to the Sun, it is also possible to assume that this celestial sphere has its center at the Sun, instead of the Earth. In this case, the planets revolve around the Sun on the orbits of much shorter (finite) radius, so the whole Solar system is contained in the celestial sphere (see Figure **??**).

Let us ignore for a moment the rotation of the Earth, which determines what portion of the sky is visible for an observer on the Earth. For example, from the location on the same side of the Earth as the Sun, the only visible star will be the Sun and there will be a daytime. In the same time, on the other side of the Earth, the Sun won't be visible, but instead an observer will see the half of the celestial sphere filled with stars. The line limiting the visibility is the horizon.

In this way, the daily rotation of the Earth around its axis determines where on the Earth either the Sun or the planets were visible at that particular moment. A horoscope, which is just the arrangement of the planets among the zodiacal constellations at a certain moment, does not depend on it at all. Nevertheless, we will later consider the daily rotation of the Earth in order to verify the visibility conditions for planets in a horoscope. For now, we will assume that our observer, like an imaginary person sitting in the center of the completely transparent Earth, can see everything at every moment — the Sun, the planets, and the stars.

From this point of view, it is easy to understand how the motion of the planets is perceived from the Earth. Indeed, the location of a planet, or even the Sun, on the celestial sphere (for an observer on the Earth) is determined by the direction of the ray from the Earth passing through that planet. If we imagine that this ray is extended indefinitely till it "intersects" the celestial sphere at some point, then at that moment this point is exactly at the position of that planet among the star constellations (see Figure **??**).

Since all the planets, including the Earth, revolve around the Sun, thus also moves the ray from the Earth pointing at any other planet (including the Sun and Moon). Besides, the beginning as well as the end point of the segment, of which this ray is an extension, move as well. Consequently, all the planets slowly and with different velocities wander among the fixed stars. A trajectory of every planet on the sky is the path of the end-point of the ray (on the celestial sphere) originated on the Earth and passing through that planet (see Figure **??**).

We should recall that all the rays pointing the planets belong (almost) to the same plane, called the *orbital plane* of the Solar system. It is well known in astronomy that although they are different, all the planes containing the orbits of planets are very close one to another. It is possible to think that approximately they all coincide with the one plane, which is the *orbital plane*. The intersection of this plane with the celestial sphere is the *celestial path* on which, to an observer on the Earth, all the planets appear to move, including the Sun and Moon.

The simplest to describe is the trajectory of the Sun. The almost uniform motion of the Earth around the Sun, causes an impression for an observer on the Earth, that the Sun revolves uniformly around the Earth. In result, we see the Sun that always moves across the sky in one direction at an even rate. It takes the Sun about a year to complete an orbit around the Earth. The exact time to make such a full revolution, which is about 365.242 days, is called the *astronomical year*.

Trajectories of the other planets are more complicated. They are obtained as a result of the interaction of two revolutions around the Sun; the one of the Earth and the other planet. As the ray, pointing the location of a planet on the celestial sphere, originates at the Earth and passes through that planet, the observed trajectory of the planet can be complicated. The planet may appear to somebody on the Earth, as moving forward, stopping for a while, than going back and finally advancing forward again, following the common for all the planets general direction. This *variable* forward planetary motion was already observed a long time ago, and there were many ancient astronomers, who tried to explain this phenomena. We should mention that the "ancient" astronomical theory of Ptolemy describes the planetary motions with rather high accuracy.

Up to now, we have discussed only the yearly motion of the Sun and the planets among the star constellations. Regarding the daily movement of the Sun on the sky — from the East to the West, it has no effect on its position among the stars, and in fact, it doesn't have impact on anything on the celestial sphere. In other words, the horoscope doesn't depend on it. Indeed, this daily motion of the Sun is in fact created by the Earth's rotation around its axis, and it has no connection with other planets, which revolve around the Earth together with the celestial sphere.

6.4 Partition of the Zodiac Belt into Zodiac Constellations

Therefore, during its yearly trip the Sun, Moon and the planets, move along the large circle on the celestial sphere, which in astronomy is called the *ecliptic*. The stars surrounding the ecliptic are grouped in the so called *zodiacal constellations*. In this way, we obtain a circular belt of constellations encompassing the firmament around the ecliptic.

To be more specific, the ecliptic is the circle obtained as the intersection of the plane, containing the orbit of the Earth revolving around the Sun, and the celestial sphere. We can assume that the celestial sphere has its center at the Sun, which also belongs to the plane containing the ecliptic. On Figure 6.2 we marked the center of the celestial sphere by the letter O. However, as we already explained, the distance from the Earth to remote stars is incomparable with the size of the Solar system, and magnitude of changes related to the Earth motion, thus it is also possible to consider the Earth to be the center of the celestial sphere.

Today it is well known that the ecliptic is also moving with time, but it is a very slow motion. Therefore, a concept of a temporary ecliptic (or time-depended ecliptic) was introduced for a specified year or epoch. The temporary position of the ecliptic during that year or epoch is called the *specified ecliptic epoch*. For example, the position of the ecliptic on January 1, 2000 is called the *ecliptic of the year 2000 epoch*, or just simply the *J2000 ecliptic*.

The letter "J" in the word J2000 is simply a reminder that in astronomy the time is measured in Julian years[3] There is another method of measuring the time in astronomy, which we also used in our calculations, namely in *Julian days of the Scaliger period* or simply in *Julian day numbers*. Beginning

[3] See [95] and [96].

with the year 4713 B.C,, J. Scaliger decided to number all the days. For example the Julian day of April 1, 1400 A.D., corresponds to the number 2232407[4].

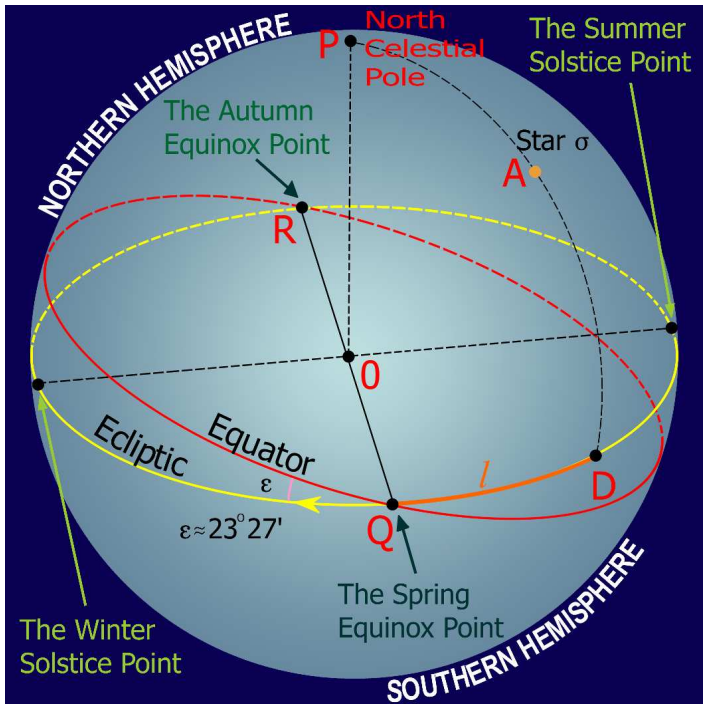


Figure 6.2: *The celestial sphere with the indicated ecliptic, equator, and the equinox and solstice points. The spring and autumn equinox points are the intersection points of the ecliptic with the equator.*

On Figure 6.2, besides the ecliptic there is another large circle marked on the celestial sphere, which is the *equator*. This equator is exactly the intersection circle of the plane containing the Earth's equator with the celestial sphere. It is a well-known fact, that the equator circle is relatively fast changing its position in time. It constantly revolves around the celestial sphere.

The ecliptic and equator intersect on the celestial sphere at the angle of $23^o27'$ approximately. The points of their intersection are denoted on Figure 6.2 by the letters Q and R. In the course of a year, the Sun in its apparent movement along the ecliptic crosses twice the equator at these points. The point Q, through which the Sun enters into the northern hemisphere, is called the *spring equinox* point. At that time the day and night are of equal length. The opposite to Q point on the celestial sphere is the *autumn equinox* point. On Figure 6.2, this point is denoted by the letter R. Through the point R the Sun enters the southern hemisphere. At that time the day and night are again of equal length.

[4] See [27], p. 316.

The winter and summer solstice points are also located on the ecliptic. The four equinox and solstice points divide the ecliptic into four equal parts (see Figure 6.2).

As time goes by, the four equinox and solstice points continually move along the ecliptic in the direction of decreasing ecliptic longitude. This motion is called in astronomy the *precession of the equinoxes* or simply the *precession*[5]. The equinoxes drift westward along the ecliptic at the rate of 1^o per 72 years. This drift caused in the Julian Calendar a shifting of the dates for the equinox days.

Indeed, since the Julian year is almost the same as the astronomical year, i.e. the time taken for the Earth to complete its orbit around the Sun, — the shifting of the spring equinox on the ecliptic results in shifting of the date of the spring equinox in Julian calendar (i.e. the "old style date"). In fact the "old style date" of the spring equinox, which in the Northern Hemisphere occurs now about March 21, is decreasing constantly at the rate of one day per 128 years (see Figure 4.7).

In order to determine positions of celestial objects, we need a system of coordinates on the celestial sphere. There are several systems of coordinates used in astronomy, but we choose the so called system of *ecliptic coordinates*, which is illustrated on Figure 6.2. Consider a meridian on the celestial sphere from the pole P passing through the point A, for which we would like to determine its coordinates. The meridian intersects the ecliptic at the point D (see Figure 6.2). The length of the arc QD will be considered to be the *ecliptic longitude* of the point A, and the length of the arc AD — its *ecliptic latitude* (the both lengths measured in degrees). Let us recall that the point Q is the spring equinox point.

In this way, the ecliptic longitude on the celestial sphere is calculated as a distance from the spring equinox point of a specific epoch, which was chosen for this purpose. In other words, the system of ecliptic coordinates is "attached" to certain fixed epoch. However, once such an epoch is chosen, the related system of ecliptic coordinates can be used to describe the positions of the Sun, Moon, the planets, and, in fact, of any celestial object **at any moment of time** from this or another epoch.

In our calculations we used the ecliptic coordinate system attached to the ecliptic J2000, i.e. on January 1, 2000.

We took, as the basis for the establishment of the ecliptic coordinates between the zodiacal constellations according to the ecliptic J2000, their J1900 coordinates (January 1, 1900)[6]. This partition of the ecliptic fits the contours of the constellations on an astronomical chart published in [49]. After readjusting this partition for the J2000 epoch (January 1, 2000), we obtained the results that are summarized in Table 6.1.

We should explain that the boundaries of the constellations are not defined precisely on the sky. Therefore, any

[5] See [95].
[6] See [173], p. 782

Zodiacal Constellation	Interval on the ecliptic (J2000 epoch)
Aries	26 — 51
Taurus	51 — 89
Gemini	89 — 118
Cancer	118 — 143
Leo	143 — 174
Virgo	174 — 215
Libra	215 — 236
Scorpio	236 — 266
Sagittarius	266 — 301
Capricorn	301 — 329
Aquarius	329 — 346
Pisces	346 — 26

Table 6.1: Zodiacal intervals on ecliptic

partition of the ecliptic into zodiacal constellations is always subjective and approximative. Different authors use slightly different partitions, but their discrepancies are not larger than 5^o or, in other words, 5 days (if use the displacement of the Sun on the ecliptic). For example, the latitudes differences between the partition of the ecliptic, shown on the sky chart by A. Dürer (see Figure 5.2), and the one used by us, are not larger than 5^o.

The subjective nature of the partition of the ecliptic into zodiacal constellations has to be taken into account. In our computations, we used two ways to eliminate errors that eventually could result from it. The first one is reflected in the computer program *Horos*, where for all the boundaries of the zodiacal constellations a 5^o margin of tolerance was enabled. The second one is applied, when in the process of decoding of the zodiacs and searching for the preliminary astronomical solutions we allow some extensions of the range of the admissible planetary positions. Namely, we permitted the planets to "wander" into neighboring constellations up to a half of constellation length. In this way, we were able to completely exclude the possibility of losing a correct solution due to imprecisions in determining the exact boundaries of the zodiacal constellations on the ecliptic. Of course, in result we've obtained a whole collection of worthless astronomical solutions, which were rejected after verifying their conformity with the partial horoscopes and the visibility attributes.

In addition, at the final stage of our research, for every obtained by us final solution, we carefully analyzed agreement between the Egyptian zodiac and the solution using the computer program *Turbo-Sky*. We should point out that in every case there was no disparity between the planetary positions on the zodiac and the final solution. In other words, all the final solutions, i.e. those preliminary solutions, which agree with the partial horoscopes and the visibility attributes, turned out to be in a very good correspondence with their zodiacs regarding the planetary positions. Regardless the fact that these final solutions were selected using only rough verification of the additional information, still they strongly agree with the zodiacs.

6.5 "Celestial Calendar" and Its Principles

Let us explain in detail how works the so called "celestial calendar," which was used to record special dates on the Egyptian zodiacs. As we already explained, a date on an Egyptian zodiacs was indicated by a horoscope showing the locations of the seven ancient planets (including the Sun and Moon) among the zodiacal constellations.

A question arises: are there sufficiently many possible planetary arrangements among the zodiac constellations, i.e. horoscopes, to indicated effectively any particular date with a precision of one or two days?

In order to give an answer, we will do a simple calculation. One year consists of 365.25 days in average. The period of history based on the written documents, according to the conventional chronology, is considered to be approximately the last 5000–6000 years, so it is a period consisting of about 2 000 000 days. Is it possible, using different horoscopes, to "cover" all these days? Maybe, there are not enough different horoscopes, so the same horoscopes have to repeat on the sky every 100 or 200 years? If it really was the case, the dates represented by Egyptian horoscopes would be completely useless for the independent chronological studies. Indeed, in such a situation it would be possible to find for a given horoscope a date in almost every century. By the way, such erroneous assumptions were made, and continue to be made, in attempts to justify the conventional chronology with help of the astronomical dating of Sumerian clay tablets (see [97] and [99]), or Egyptian zodiacs (see [10], [11], and [98])[7].

Let us return to the estimation of the number of different horoscopes. Fortunately, this problem is much simpler than it appears at the first glance. In fact this number is very large — there are over 3.5 million of different horoscopes. Consequently, we can state safely that it is large enough for our purpose of independent dating.

Indeed, let us show how this number was calculated. Recall that every planet can be located in any of the twelve zodiacal constellations , while the inner planets — Mercury and Venus, — are always located in the proximity of the Sun. In fact, the distance of Venus from the Sun is never larger than 48^o in longitude, while Mercury is even closer to the Sun at the distance less than 28^o in longitude[8]. Consequently, once the Sun's position on the zodiacal belt is fixed, Mercury can be not further than one, and Venus not further than two, zodiacal constellations from the Sun. Let us recall that an average length of a zodiacal constellation is about 30^o. In this case we obtain that Venus can be located in 5 possible zodiacal constellations, which are the constellation where the

[7] See also section 3.5.
[8] See [15].

Sun is located or 2 neighboring constellations on each side of the Sun. Similarly, having the position of the Sun fixed, Mercury can be located in only 3 possible zodiacal constellations. All the other planets can be located in any of the twelve zodiacal constellations, independent on the Sun's position. Therefore, we obtain the following number of possible different horoscopes:

$$12 \times 12 \times 12 \times 12 \times 12 \times 5 \times 3 = 3\ 732\ 480.$$

Without trying to be too precise, we can assume that an average horoscope remains on the sky for about 24 hours. Therefore, by dividing the number of all possible horoscopes by 365 days, we will get the number of years corresponding to the average radius of repeatability of the same horoscope, which is about 10 thousand years. In other words, if the distribution of horoscopes was completely chaotic, then every horoscope would repeat itself every 10 thousand years in average. However, this distribution is not completely chaotic, thus a horoscope can repeat two or even three times within the period of 1500–2000 years, and then, as a rule, disappear for many dozens of thousands of years.

This repeatability of horoscopes is related to the existence of the so-called *pseudo-periods* in the planetary configuration of the Solar system, i.e. the false periods of time after which the planetary locations around the Sun repeat themselves in a similar configuration. After that, there is one more repetition of a similar, but more distorted, configuration of planetary positions. After such two or three reappearances, usually there is no more pseudo-periodic repetition of such a configuration. One of such pseudo-periods of 854 years was investigated by N.A. Morozov, and later by N.S. Kellin and D.V. Denisenko. In relation to this problem, Morozov wrote:

"*Trying to shorten the computations, my assistant from the Astronomical Department of the State Institute for Natural Sciences ("Lesgaft Institute"), late M.A. Vil'ev, found an approximate period of 912.9 years for the geocentric configuration of Jupiter and Saturn. Later, I have concluded that 854 years period works even better ... But precisely speaking, Saturn returns into the same point on the sky after 854.25 years and not 854 years, when it appears 3^o behind, while Jupiter returns to its previous geocentric location after 854.05 years, so it appears 1.5^o behind. ... The New and Half Moon phases occur in 854 years periodic series after 8 days in average and Mars returns closely to its previous location. In addition, Venus and Mercury have also tendency to be located in such series two-three times on the same side of the Sun, either to the South or North from it. Nevertheless, it would be very imprudent ... to use this approximate period ... on very long time intervals (like 10 periods, i.e. 8500 years).*"[9]

N.S. Kellin and D.V. Denisenko investigated this pseudo-period, which was found by N.A. Morozov, and concluded that from the viewpoint of an observer on the Earth, it sometimes works even in cases when the whole planetary configuration changes significantly. They wrote:

During 854 years, Venus makes 1388 full revolutions around the Sun plus additional 70^o, while after this time Mercury still will be 40^o behind its initial position. In spite of the fact that these shifts are substantially larger than the displacements of Mars, Jupiter, and Saturn (in average 21^o, −1.5^o, and −3^o, respectively), for an observer on the Earth, Mercury and Venus may appear not only in the same zodiacal constellation, but practically at the same as their initial locations. The reason fort this is that they revolve around the Sun closer to the Earth, thus their projections can be at the same points even if they are located at different places on their orbits[10] ."

Finding these pseudo-periods leads to a conclusion that for many horoscopes, as long as they appeared in the last 2–3 thousand years, they could repeated themselves two or three times during the historical time interval. From the astronomical dating point of view, it brings us to the existence of undesirably many solutions for one horoscope in this time interval. However, usually there are only few such solutions — two or three, sometimes one, or even four. Therefore, if in addition to the horoscope we would also have, even a very small, nontrivial astronomical information characterizing the encoded date, then it could be that there is only one final solution. This is exactly the situation with the Egyptian zodiacs.

On the other hand, the repetition of horoscopes means also that, in the historical time interval of the last 2–3 thousand years, there were in fact less horoscopes appearing on the sky. Thus, it follows from our reasoning that a "taken from the air" imaginary horoscope most probably won't have any solution in this time interval.

We can conclude our reasoning with the statement that the "celestial calendar" encoded into Egyptian zodiacs was indeed an effective way to preserve till present time **the exact and precise dates of the ancient Egyptian history**. The whole idea of using this "celestial calendar" for commemorating the burial dates is clearly related to the fact that it is an exceptional and practically everlasting way to record the dates. It doesn't depend on any type of calendar, era of any imperial reign, conventions of recording numbers, or other events that could be easily forgotten. In other words, it is a universal way to record the dates that is independent on anything that could be forgotten by future generations.

Indeed, to record a date using the "celestial calendar," there was no need to use words or numbers. Everything was done with a help of pictures only. Of course, in order to decode the recorded date, it is necessary to know the meaning of the symbols of zodiacal constellations and the planetary figures. We have to agree with the ancient Egyptians that, as long as the sky filled with stars exists above us, people will always remember these astronomical notions. Indeed, we have preserved till the present times sufficiently enough information above the ancient astronomy to be able to decode this "celestial dates." These old records help us to understand the

[9] See [4], Vol.6, pp. 706, 708

[10] See [15].

meaning of the ancient astronomical symbolism on the Egyptian zodiacs.

It is the most fortunate that today we are able, but not without effort, to read these old "celestial" Egyptian dates, and determine what was the exact time of the existence of the ancient Egypt.

6.6 Principal Accuracy of the Computations of the Past Planetary Positions

For the calculations of the visible from the Earth positions of the Sun, Mercury, Saturn, Jupiter, Mars and Venus, we used the computational program *PLANETAP*, written in the language FORTRAN by French astronomers J.L. Simon, P. Bretagnon, J. Chapront, M. Chapront-Touze, G. Francou, and J. Laskar, from le Bureau des Longitudes in Paris, which was published in the astronomical journal "Astronomy and Astrophysics" in 1994[11].

The program *PLANETAP* allows to compute the past coordinates, radial vectors and instantaneous velocities of the 8 basic planets of the solar system: Earth (or more precisely – the center of mass of the Earth-Moon system), Saturn, Jupiter, Mercury, Mars, Venus, Uranus, and Neptune. The heliocentric coordinates of the planets, used in the *PLANETAP*, are computed according to the ecliptic plane for the epoch J2000 (Julian day JD2451545.0)[12].

The authors of the program *PLANETAP* guarantee the precision not less than 2^o for all the computations of the heliocentric longitudes of all the eight planets in the time interval from the year 1000 A.D.[13]. For the dates earlier than the year 1000, the precision of this program gradually decreases, however, up to the first centuries A.D., it is still sufficient for our purposes. Let us recall that we are satisfied with the coordinates of the visible from the Earth planets that are precise only up to few degrees. In fact for the dating of the Egyptian zodiacs the higher than this precision is not needed. Nevertheless, in order to reduce the growth of the computational errors for the epoch preceding the year 1000 A.D., in the algorithm of the program *PLANETAP*, we truncated beginning from the year 1000 A.D. the higher terms in the power series expansions of the average orbit elements. The trigonometric representations, which did not contain increasing terms, were left unchanged.

We used the program *PLANETAP* as a subroutine for our computer program *HOROS*, which was designed precisely for the purpose of dating of the Egyptian zodiacs or other old zodiacs of a similar type. The program *HOROS* uses the calculations of the heliocentric planetary coordinates, done by the program *PLANETAP*, to compute the ecliptic longitudes of the visible from the Earth planets: Saturn, Jupiter, Mercury, Mars, and Venus. As the beginning point for the longitudes we chose the spring equinox of the epoch J2000.

In the program *HOROS*, the location of the Moon among the zodiacal constellations are computed using another subroutine, which was written by the same group of the specialists from *le Bureau des Longitudes* in Paris. More precisely, we used the program *ELP2000-85 (version 1.0)* for the calculations of the lunar ephemeris, written using language FORTRAN by the astronomers J. Chapront and M. Chapront-Touze[14]. This program allows to compute with high precision the visible from the Earth position of the Moon on the celestial sphere. For not too distant from our times epochs, the precision of this program (in the variant we used in the program HOROS), according to its authors, is not smaller than 1 second[15]. For the dates from 1–2 thousands years ago, its precision, as expected, is significantly lower. However, let us recall again that for the dating of the Egyptian zodiacs, which only approximately show the planetary positions, we do not need very high precision of these computations. In fact, we could be completely satisfied with a precision of up to few degrees, but the precision of the program *ELP2000-85* is much higher than that.

With the help of the programs *PLANETAP* and *ELP2000-85*, which allowed us to compute the past positions on the sky of all the ancient planets, we wrote another computer program *HOROS*, which was specially designed for the astronomical dating of old zodiacs. For an arbitrary approximate configuration of the ancient planets, the program *Horos* calculates all the possible dates when such configuration could occur. Moreover, if the source of this configuration, i.e. an Egyptian zodiac, specifies a specific order of these planets on the zodiacal belt, then the program *HOROS* indicates also if the order (partial or complete) of the planets on these dates was exactly as required.

For a detail description of the program *HOROS*, the associated with it files, and how to use it, we refer the reader to Appendix. The program itself can be downloaded from the following web site on the Internet:

`http://krawcewicz.net/download`

or from any of the other sites listed at the list of references at the end of the book.

6.7 Dating of Egyptian Zodiacs Based on Contents of the Main and Partial Horoscopes

In this section we will describe our procedure for the astronomical dating of the Egyptian zodiacs. It is remarkably different from the methods used earlier by the other researchers,

[11] See [50].
[12] See [50].
[13] See [50].
[14] See [51].
[15] See [51].

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mainly because it uses more complete decoding of the astronomical contents of the zodiacs.

Let us point out, right from the beginning, that by the astronomical dating of the Egyptian zodiacs, we mean not finding the dates of their creations, but the dates, which were encoded by the ancient Egyptians on these zodiacs. With the help of the available today computational technology, we have an opportunity to discover many of these dates. Regarding the dates of the creation of these zodiacs, it is completely another problem, which has to be treated differently. One thing is sure that they couldn't be created earlier than the dates encoded in them. Indeed, it is reasonable to think that people at that time, as it would be today, used these zodiacs to commemorate certain events from the past, and not from the future.

On the other hand, there was nothing that could prevent an ancient Egyptian artist from encoding of a much older date into a zodiac. As we explained earlier, ancient astronomers were able to calculate the planetary positions for a specified date. It is also possible that they already had a chronological concept of their own "ancient," but not always correct, chronology. Therefore, in the case of some Egyptian zodiacs, we may be dealing with the dates that were ancient even for the creators of these zodiacs, and are represented by the planetary configurations resulting from astronomical computations.

Our astronomical dating procedure of the Egyptian zodiacs consists of the following steps:

6.7.1 Step 1: Identification of the Planets in the Main Horoscope with All Possible Variants Considered.

For a given Egyptian zodiac, we recognize with the help of the comparative tables of Egyptian astronomical symbols (see section 5.4), all the possible variants of identification of the planetary symbols in the main horoscope, i.e. the variants of decoding of its main horoscope.

Usually, there are always several variants of decoding. For example, very often the symbols of the Sun and Moon, shown on an Egyptian zodiac, are very similar. In such a situation, we have to consider all the possible choices of their identification. Sometimes, there are problems with identification of the other planets, whose symbols couldn't be definitely recognize at the preliminary stage.

6.7.2 Step 2: Computation of the Dates for All Variants of Decoding

For every variant of decoding of the main horoscope, obtained in the previous step, we compute all the dates, indicating when the configuration of the planets, coinciding with the arrangement of the planets on the zodiac (according to the considered variant of decoding) occured on the real sky. These computations were carried out using the computer program *Horos* (see section 6.6).

In the same time, we verify if the order of the planets is the same as shown on the zodiac. Let us point out that not always this order can be fully determined. In some cases the order is not clear. For example, on zodiacs of the round type, a pair of planets can be arranged in such a way that any order of these planets is compatible with the picture of the zodiac. Or, a zodiac could be partially damaged, so the order of the planets in the damaged area is of course undefined. For these reasons, the program *Horos* was designed in such a way that it is possible to deal with all kinds of such situations.

The computations were carried out for the time interval from the year 500 B.C. till 1900 A.D. We decided to choose the lower bound of 500 B.C. for this interval based on the fact that, according to presently accepted Scaliger's chronology of Ancient Egypt, all the zodiacs allowing their decoding and astronomical dating, i.e. the zodiacs of the "Greek-Babylonian" type, began to appear in Egypt not earlier than in the first century B.C.[16]. Before that time, Egyptian zodiacs were completely different, and the rules for their decoding still have to be established[17]. In order to properly cover in our computations the assumed by Egyptologists epoch of the "Greek-Babylonian" zodiacs, a margin of additional few centuries was included in the lower bound for the time interval.

All the computed dates from the interval 500 B.C. — 1900 A.D., for which the planetary configuration on the sky was conformed with the horoscope on the zodiac (**with the same order of planets**), were included in the list of all possible (*admissible*) dates for the considered variant of decoding. As a result, for every analyzed zodiac, we've obtained a table with columns corresponding to the specified variants of decoding of the main horoscope, each column containing all the admissible dates computed by the program *Horos*. The number of admissible dates varied from 4–5 to several dozens for some of the considered zodiacs.

It is very interesting, that in the case of many analyzed by us Egyptian zodiacs, there was not even one admissible date falling into the postulated by Egyptologists epoch of few centuries before and after the beginning of our era. This fact fully confirms the Morozov's claim that for that epoch it doesn't exist any admissible astronomical solution, so needed by Egyptologists to support their version of Egyptian chronology. All the postulated by various authors astronomical solutions, related to that epoch, admit such incredible flaws that it is difficult at all to consider them as solutions[18].

[16] See [31], p. 40.
[17] See [31], p. 38.
[18] See [4], Vol.6.

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6.7.3 Step 3: Validation of Dates Based on the Precise Planetary Positions, Visibility Attributes, and Partial Horoscopes. Rejection of Incomplete Solutions.

With the help of the astronomical software *Turbo-Sky*, written by A. Volynkin, we checked for each of the admissible dates the following:

[A] **Exact Correspondence to the Main Horoscope:** At this point, we verified if there is **exact correspondence** between the real (computed) configuration of the planets on the zodiacal belt, and the initial data, i.e. the main horoscope according to the considered decoding. The necessity of such a verification is dictated by the fact that in our computations we have significantly weaken the requirements related to the acceptable locations of planets on the zodiacal belt. Let us recall that we did it in order to avoid the impact of undefined boundaries between the zodiacal constellations and other inevitable imprecisions.

[B] **Conformity to the Visibility Attributes of Venus, Mercury and Other Planets in Proximity of the Sun.** For more information about the visibility attributes, we refer to section 5.7.

- We were verifying the visibility of planets for the computed solutions at the two locations of an observer: Alexandria and Luxor (which is located 500 km South from Alexandria). In section 5.11, we explained why these two places were chosen for this verification. In the case of any doubt, other locations further to the North were also considered.
- Planets and stars can be observed only when the sky is sufficiently dark, i.e. only when the Sun is located sufficiently far behind the local horizon. However, **depending on the brightness** of these planets and stars, the required for their visibility submersion of the Sun behind the horizon is also **different**. Let us recall shortly how the brightness of stars and planets is measured. We will use this information later for the investigation of the Egyptian zodiacs.
- In astronomy, the measurement of the brightness of stars and other celestial objects (nebulae, galaxies, planets, etc.) is done according to the so-called *photometric scale*. The brightness of stars is denoted by the letter M, which is called the *magnitude*. **Brighter** the star, **smaller** is its photometric magnitude. For the brightest celestial objects their magnitude is negative, but there are very few such stars or planets. These are the brightest stars and the planets, which were at the moment of observations not too far from the Sun. We should explain that the brightness of the planets, contrary to the brightness of stars, depends on their location with respect to the Sun and the Earth — the sunlight is reflected from the planets.
- Sirius, also called Alpha Canis Majoris, or Dog Star, is brightest star in the night sky, with apparent visual magnitude $M = -1.46$[19]. There are only two or three stars on the sky with sufficiently strong brightness, which can be compared to Sirius. The brightest planet is Venus. Its magnitude can sometimes reach as much as $M = -5$, and most of the time is not smaller than $M = -3$. When approaching the Sun, Venus gradually becomes brighter and brighter to finally disappear from the sky in the sunlight. Then it reappears on the other side of the Sun, i.e. Venus changes its morning visibility to evening visibility or vice versa. The other planets, when approaching the Sun can reach the visibility magnitude up to $M = -2$. Let us point out that the magnitude $M = 0$ is in fact related to a very high visibility. The brightness of dim stars are from $M = +5$ to $M = +6$. The star with magnitude in the range $M = +6$ or $M = +7$ can not be seen with a naked eye[20].
- The stars, with similar to Sirius photometric magnitude, and the planets close to the Sun (but still sufficiently far from it, so the sunlight didn't render them invisible), are the **brightest stars** on the sky, with Venus being the brightest among them. These planets and stars become visible on the sky with the submersion of the Sun behind the local horizon not less than 7^o. **If the submersion of the Sun is smaller than 7^o, no planet nor star** (as stars are even less bright than planets) **is visible**[21]. The only exception is Moon, that can be even seen in the middle of the day. The bright stars are those planets and stars for which the photometric magnitude is around $M = +1$. There are not many such stars on the sky — possible around two dozens. They become visible on the sky with the Sun's submersion of 9^o–10^o. The class of the fifth and sixth magnitude of visibility is composed of those stars and planets with photometric magnitude around $M = +5$ and $M = +6$. They are the faintest stars visible to the unaided eye, which can only be observed in a complete darkness. The **required submersion of the Sun behind the local horizon should in this case be not less than 18^o**, what is also considered in astronomy to be the beginning or the end of the night[22]. At that time even the dimmest stars become visible.
- In this way, for checking the visibility of the planets we needed their photometric magnitude, which was computed using the program *Turbo-Sky*, written by A. Volynkin. A planet with the photometric magnitude $M = -1$ was considered to be visible, if at the time of observation the submersion of the Sun was not less than 7^o. If the magnitude was $M = +2$, the planet was considered as visible with the submersion of the Sun of 10^o at least. All the doubtful or border cases were always decided in favor of a solution. In other words, we didn't require a precise correspon-

[19] See [93] and [94].
[20] See [93].
[21] See [27], p. 16.
[22] See [27], p. 16.

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dence between the initial data and the solution, but we looked at such a solution that could be regarded as eventually satisfying the required conditions. If it was the case, we did not reject such a solution. For example, a planet was annotated on the Egyptian zodiac with a visibility attribute, while it was possible to confirm its visibility on the real sky only for a specific time of observations. Namely, either before the dawn or after the dusk. In such cases of a *morning* or *evening visibility* only, the related **solution was not rejected**.

- The submersion of the Sun was measured in degrees in direction perpendicular to the local horizon. Let us point out, that the submersion of the Sun could in fact be much smaller than the actual distance (also measured in degrees) from the Sun to the planet which was at this moment on the horizon (either rising above it or setting down). Indeed, the shortest ark on the celestial sphere, joining the planet and the Sun, doesn't need to be perpendicular to the horizon. Therefore, it is clear that using the distance from the Sun to a planet for verification of the visibility conditions can lead to a mistake. Considering the time difference between the rising (or setting down) of the Sun and the planet can also lead to an error. In fact, it may take sometimes longer sometimes shorter for the Sun to reach the horizon from the positions with the same submersion behind the horizon. It depends on the angle between the ecliptic and the local horizon, which is different at different locations on the Earth. This angle varies with the latitude of the place of observations.

[C] **Accordance with the Partial Horoscopes.** We required that the symbolic description of every partial horoscope, present on the Egyptian zodiac, should be in full agreement with the real astronomical situation on the sky, which occured near the corresponding equinox or solstice point for the year indicated by the considered solution. It turned out in practice, that this was a very strong requirement, which could never be satisfied by a random solution. For our purposes it was sufficient to have one or two non-trivial partial horoscopes in order to eliminate all the wrong solutions. (Let us recall that sometimes the partial horoscopes shown on the Egyptian zodiac may be trivial, i.e. any solution will always satisfy them).

- In general, the verification of the solutions, with respect to the partial horoscopes, depends strongly on the convention when, according to the creators of the zodiac, the beginning of the year was taking place. For example, if the obtained solution indicated the spring date for the main horoscope, than in order to check its requirements related to the partial horoscope of the winter solstice, we had to proceed in different ways, depending when was the beginning of the year. If the beginning of the year was in September, we analyzed the winter solstice that took place in December preceding the main date. Or, if the beginning of the year was in January, then we looked at the winter solstice that occurred in December following the main date (i.e. in December of the same year).
- We have already mentioned earlier, that according to all the indications, the beginning of the year used on the Egyptian zodiacs was in September. However, we shouldn't exclude a possibility that, on certain zodiacs, the beginning of the year may turn out to be in March or January. Therefore, in our verification of the solutions with respect to the partial horoscopes, we considered all the possible conventions for the beginning of the year. We did it as follows: first we were assuming that the beginning of the year was in September, and if the solution failed to agree with the partial horoscopes, other beginnings of the year were also considered. However, for all the obtained final solutions the beginning of the year turned out to be in September.

6.8 Color-Annotated Zodiacs

At the first glance, this Egyptian zodiac looks like a complicated and confusing collection of symbols. Only after long and careful analysis of its contents it becomes clear that it is indeed an astronomical chart.

In previous chapters we've described the main features of an Egyptian zodiac. It turned out that a usual Egyptian zodiac is composed of several symbolic "layers," each of them carrying its own "load" of information. With some time and a little patience, an experienced eye becomes able to distinguish those symbols on an Egyptian zodiac, which belong to the same layer. Only then, the meaning of the zodiac becomes understandable.

In order to make easier for the reader to recognize different symbolic layers on Egyptian zodiacs, we will use the so called *color-annotated zodiacs*. Let us explain what it is about. A *color-annotated zodiac* is the first concrete result of the initial stage of the analysis of an Egyptian zodiac. At this stage we identify the symbols representing zodiacal constellations, planets, partial horoscopes, etc. However, at this stage, it is still not fully determined what exactly each of these symbols represents. For example, it is still uncertain what exactly is the planet represented by a certain planetary symbol on the zodiac, or what is the meaning of the symbols shown in a partial horoscope.

More precisely, a color-annotated zodiac is a drawing of an Egyptian zodiac, on which astronomical symbols, related to different symbolic levels, were marked using different colors. The colors were chosen arbitrarily, without any relation to the actual meaning of the zodiac. These colors are:

(1) **Red — Figures of the Zodiacal Constellations**. We used this color to partition the astronomical chart, shown on an Egyptian zodiac, into zodiacal constellations.

(2) **Yellow – Symbols of the Planets in the Main Horoscope**. This part of the horoscope is the actual encoding of the date shown of the zodiac. A distribution of the planets among the zodiacal constellations represents a horoscope, which is the way ancient Egyptians were recording the dates using this symbolic "celestial calendar." However, at this point, we are not completely sure what exactly is the horoscope shown on the zodiac. In order to decode the horoscope, we need to identify among these symbols all the seven planets of the antiquity. This is much more complicated task than just a simple recognition of the planetary symbols, which can be usually identified by their attributes, for example — the planetary walking sticks (see the previous chapters). Assigning the "roles" to these planetary figures is not always easy and straight forward process.

Nevertheless, just by looking at the color-annotated zodiac, it is quite easy to see some possible variants of decoding of the main horoscope on this zodiac.

(3) **Light-Blue — Symbols of the Partial Horoscopes**. Here we are talking about the symbols of the equinoxes and solstices, surrounded by the partial horoscopes, together with the planetary symbols in these horoscopes. We've already discussed in the previous chapters the symbols of the partial horoscopes.

(4) **Brown — Symbols of the Decans**. These symbols divides each zodiacal constellation into three parts, each of them occupying a sector of about 10^o on the ecliptic. This can be considered as an explanation of the name "decan," which was introduced by N.A. Morozov[23]. These symbols are present on the Long Denderah zodiac, where they are shown in form of female figures (see section 5.2). However, the existence of decans doesn't necessarily mean that the precision of the planetary locations shown on a zodiac is three times higher — up to 10^o instead of 30^o. The precision of the Long zodiac is still up to 30^o, in spite of the presence of decans (see the discussion of this problem in section 5.2).

(5) **Green — the Symbols Accompanying the Planetary Figures of the Main Horoscope, and the Supplementary Astronomical Symbols**. Examples of such symbols were discussed in section 5.9.

(6) **Uncolored Symbols**. In this way are shown all the symbols with unknown or unclear meaning to us. We also left uncolored the symbols which had no apparent connection with the encoded in the zodiac date.

In the case of a symbol, for which it was not fully clear to what layer it belongs, it was divided in parts and colored using different colors, depending on the layers it could be related to. The resulting from it possible interpretations of the symbols, were added to the collection of all the admissible variants of decoding for the zodiac. The pictures of the color-annotated zodiacs will be shown in sections dealing with the dating of the individual zodiacs.

[23] See [4], Vol.6.

6.9 Conclusive Determination of the Main Date. Final (Complete) Solutions.

As a consequence of applying the presented in the previous section method, we could conclude that either all the preliminary solutions were rejected, or there was exactly one solution selected, except of some rare cases, where there was more than one solution left. This was the case with certain very "poor" or damaged zodiacs.

Obtained in this way, for an Egyptian zodiac, solution we will be called the *final* or *complete solution*.

If on an Egyptian zodiac at the preliminary stage (Step 1), the main horoscope was decoded correctly (at least in one of the considered variants), then as the results of the computations there was always a unique final solution obtained for this horoscope. It turned out to became a kind of a rule that all the final solutions coincided perfectly with the astronomical pictures shown on the zodiacs.

If in the case, for which all the considered variants of decoding were incorrect for a zodiac with at least one non-trivial partial horoscope, there was not even one final solution found. The incorrect decodings were basically the consequences of the hidden symbols or conventions, which remained at that stage unknown to us. In such cases we had to return to the Step 1 and continue our work on the decoding of the zodiac.

Let us emphasize the most important outcome of our research: **our procedure for decoding and the astronomical dating of the Egyptian zodiacs, in the most cases, allowed us to determine uniquely the date that was encoded in the main horoscope** — the ancient "celestial calendar."

As we will see in the next chapters, all these dates turned out to be **medieval**.

6.10 Constellation-Sized Scale of The Zodiacal Belt

Let us discuss one more aspect of our method for the astronomical dating of the Egyptian zodiacs. As we've explained it earlier, the results of the preliminary decoding of an Egyptian zodiac were formulated as one or more variants for its decoding of the main horoscope, i.e. the descriptions of the planetary locations with respect to the zodiacal constellations. It is the horoscope that carries the investigated by us date encoded by means of the "celestial calendar." In the subsequent step, every identified variant of decoding was worked out using the program *Horos*.

It is clear that all the identified variants of the main horoscope do not provide precise information about the planetary locations. For example, it is not possible to determine exactly in what part of a zodiacal constellation a particular planet was

located. In principle, the structure of the Egyptian zodiacs do not permit to indicate the positions of planets with high accuracy. All the analyzed by us horoscopes on the Egyptian zodiacs were merely approximate descriptions of the planetary locations with respect to the zodiacal figures.

However, in order to carry out the astronomical computations, for each of the planets we need to set up, using the ecliptic longitude measured in degrees, the intervals of its possible locations. It is difficult, just by looking on an Egyptian zodiac, to indicate in degrees its approximate location. Indeed, there is no scale or other numerical indicators on a zodiac, which could help us with this task. There are only pictures. Therefore, in order to express the planetary locations in degrees, it would be necessary to make several simple (albeit annoying) calculations.

To avoid these complications, we wrote the program *Horos* in such a way that the locations of the planets are specified with respect to the *constellation-sized scale* of the zodiacal belt, instead of degrees of latitude. This scale allows us to determine the planetary positions directly from the Egyptian zodiac, where we can see, for example, that *a planetary figure is shown in Virgo or in the first half of Libra, which is next to Virgo*, or that if *this planet is located in Aries, probably on its boundary, possibly even in the next constellations, but not further from Aries than 1/3 of its length.*

Let us recall that in relation to the decoding of zodiacs, in order to avoid losing the correct solution, we agreed to enlarge the boundaries of the interval for possible planetary locations. As the results of this enlargement, the obtained in this way incorrect solutions were rejected anyway because of their incompatibility with partial horoscopes. However, this enlargement resulted in the intervals of admissible planetary positions of the type: *half of Aquarius, Capricorn, and half of Sagittarius*, etc.

Therefore, we chose the following scale:

(1) We divide the ecliptic J2000 into 12 non-equal parts, where each of these parts corresponds to one zodiacal constellation. The boundary points for this partition were discussed in section 6.4.
(2) We denote using the integers from 0 to 12 (see Figure 6.3) the points of this partition, dividing the ecliptic into sectors occupied by the zodiacal constellations. In this way we obtain on the ecliptic J2000 a nonuniform scale. We "close" this scale by putting $12 = 0$, what is dictated by the fact that the ecliptic is a circle, where the points 0 and 12 are identified.

In this way, to every zodiacal constellation corresponds an interval of the length one. However, the real lengths of these unit intervals are different and equal to the actual lengths of the zodiacal constellations.

Consequently, we have the following constellation-sized scale on the ecliptic J2000:

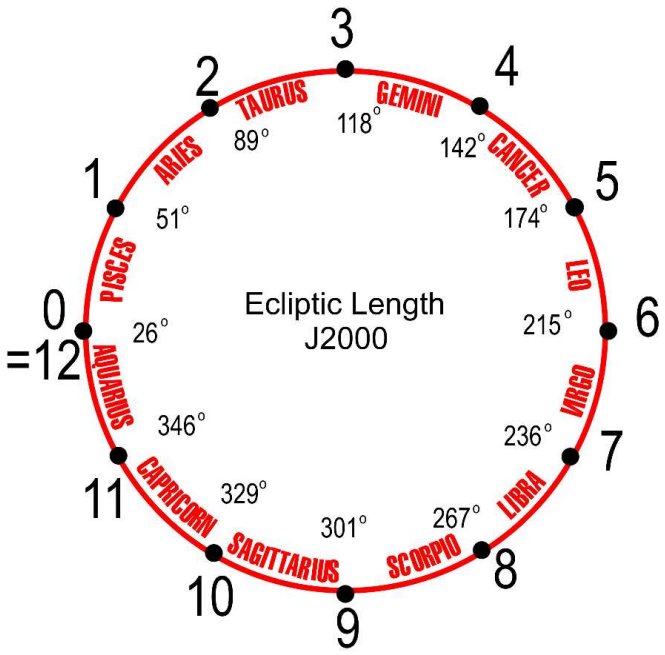

Figure 6.3: *The cyclic constellation-sized scale on the ecliptic J2000.*

```
--------------------------------------------------
<0> ARIES <1> TAUR <2> GEMINI <3> CANCER <4> LEO
<5> VIRGO <6> LIBRA <7> SCORP <8> SAGIT <9> CAPRI
<10> AQUAR <11> PISCES <12=0>
--------------------------------------------------
```

Now, when describing the planetary locations on the Egyptian zodiacs, we will be indicating the corresponding points on the ecliptic using not degrees, but the above constellation-sized scale. For example, the coordinate 1.5 will correspond to the middle point of the constellation Taurus, or more precisely the point on the ecliptic J2000 with the latitude 70^o. The point 13.5 will correspond to exactly the same point, because this scale is cyclic with period 12, so $13.5 - 12 = 1.5$.

This constellation-sized scale will be used to specify the horoscopes decoded from the Egyptian zodiacs as the input for the program *Horos*. For example, using this scale the interval *half of Aquarius, Capricorn, and half of Sagittarius* will be simply the interval *from* 8.5 (*the middle of Sagittarius*) *to* 10.5 (*the middle of Aquarius*).

Since the constellation-sized scale is cyclic, the beginning of the interval can be smaller than its end. In this way, the interval $(11.5, 0.33)$ denotes the sector: *from the middle of Pisces to the first one-third of Aries.*

We will use the constellation-sized scale to specify for each planet the *range of all its admissible positions*, which will be an interval showing all its possible positions according to the information retrieved from the Egyptian zodiac.

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6.11 Best Points for the Planets and the Planetary Order

For each planet, besides the range of admissible positions, we will also specify **its exemplary position on the sky**, which in some sense would correspond the best location of its planetary figure on the Egyptian zodiac. This point on the ecliptic J2000 will be called the **"best point"** or the **"exemplary position point"** of this planet.

Actually, the choice of such a point can be strongly subjective. Therefore, the positions of the best points have no impact on the rejection of incompatible solutions. However, the **order of the "best points"** plays and important role in the rejection process. This order should be exactly the same as the order of planets on the Egyptian zodiac, according to the considered decoding variant of the main horoscope. For each computed solution, the program *Horos* compares the order of planets on the ecliptic with the order of the "best points." Those solutions with the order of planets different than the order indicated by the "best points" are **rejected**.

If the arrangement of two or more planetary figures is such that it is impossible to determine their definite order, in the computations we have assigned to all those planets *the same value of the best point*. As a consequence, the program *Horos* will assess any arrangement of those planets as correct with respect to their order. On the other hand, the order of all the other planets will be verified according to the order of their "best points." Let us point out, that situations with undetermined order of some planetary symbols indeed occurred on the Egyptian zodiacs. In particular, this was the case with the zodiacs of round type, where the figures are not arranged in a sequential order, but are rather scattered around the whole picture.

It may happen that, for a certain planet, we are not able at all to identify its location on the ecliptic. For example, it could happen that we were unable to recognize the figure representing a particular planet on the zodiac. In this case the range of admissible positions for this planet should be **from** 0 to 12, and as its best point a **number greater than 100** should assigned. For the program *Horos* this will be an indication that this planet should be considered as *undefined* or *free*, i.e. there are no constrains imposed on its location. If a best point is not indicated in the input data, then the program *Horos* will respond with an error message.

6.12 Mean Discrepancy from the Best Points as an Indicator of the Accuracy of the Solution

The "best points" were also used for each solution to calculate the numerical indicator called "*mean discrepancy from the best points*." Because the choice of the "best points" was not independent of subjective factors, this number can only be used as an **advisory indicator** for the correspondence between the configuration of the planets in the solution, and the arrangement shown on the Egyptian zodiac. In spite of its dependencies, such an indicator turns out to be very useful.

The mean discrepancy from the best points is evaluated in degrees. It is obtained by taking the average value for all the distances from the corresponding best points for all the seven planets. Recall that the "best points" represent the "ideal" locations of the planets, as it is suggested by the picture on the zodiac. When it is possible to identify all the planets on the zodiac, then the corresponding best points could be determined with the precision up to 15^o, which corresponds to an average length of a zodiacal constellation. The precision of 15^o degree is the best precision that can be expected for an Egyptian zodiac. Therefore, the values of the mean discrepancy from the best points in the range from 0^o to 15^o should be considered as very good, and in the range from 15^o to 20^o, as satisfactory. However, even higher values of this indicator can occur in the case of a correct astronomical solution. But, it can happen only in a situation where it was not possible to determine in advance a definite position(s) of certain planet(s). Such situation can arise in a case, for example, of a damaged zodiac, where some of its parts were destroyed.

If the "best point" for a certain planet is undefined, i.e. its value is assumed to be larger than 100, then in such a situation it was possible to evaluate the mean discrepancy indicator by assuming (for this purpose only) that its best point was exactly the calculated position of the planet. However, this wouldn't be right, because such an assumption could lead to a **significantly lower** value of the mean discrepancy indicator for that solution. In particular, in the case where there were more than one undefined (free) planet in the input data, another problem appeared. How the solutions with different number of undefined (free) planets should be compared? To solve these complications, in our computations we applied the following algorithm, which helped to eliminate these undesired effects:

(1) Computations of the mean discrepancy indicator were carried out successively with respect to the sequential order of the planets.
(2) In the case an undefined (free) planet was encountered, a temporary best point (which was only used in this computations) was assigned to it. This best point was evaluated based on the average distances from the best points for the other planets, for which the best points were defined or already computed in the previous steps of this process.

6.13 Example of the Input Data for the Program *Horos*

Let us present as an example a sample input data file `INPUT.TXT` for the program *Horos*. This data was obtained for one variant of decoding of the main horoscope on the Long Denderah zodiac. The ranges of the admissible planetary positions and the best points are expressed in coordinates of the constellation-sized scale on the ecliptic J2000.

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There was no need for even slightest calculations in order to create the input data — all these values were retrieved directly form the zodiac. The conversion of the data from the constellation-sized scale to the ecliptic longitude in degrees, were done by the program *Horos*.

```
            SAMPLE INPUT FILE: INPUT.TXT

INPUT DATA FOR TH PROGRAM <<HOROS>> FOR
COMPUTATIONS OF THE HOROSCOPE DATES

----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
      11.0   6.0    9.0   11.0   10.0   0.0    0.0 # TO:
----------------------------------------#
       1.0   8.0   11.0    1.0   12.0   2.0    2.0
# BEST POINTS: ----------------------------------#
      11.5   7.5    9.5   12.0   11.0   0.5    1.0
-------------------END OF DATA--------------------
```

Comments can be added to the file `INPUT.TXT`, however, the lines beginning with the symbol `#`, preceding the lines containing the data, should be left **unaltered**. Moreover, no other lines, than those three, in the file `INPUT.TXT`, should begin with the symbol `#`, nor the order of the data should be changed.

6.14 Check-up List for an Astronomical Solution

For every solution, obtained as a result of the astronomical computations done by the program *Horos*, we created a special table. In this table we compared the properties of the solution with the features shown on the Egyptian zodiac, which were not examined during the verification process of the admissible solutions in Step 2 (see section 6.7).

In particular, the following properties of the solutions were examined:

- **Visibility Attributes** for Venus, Mercury and other planets, which were located in the proximity of the Sun on the main horoscope (see section 5.7).
- **Agreement with Four Partial Horoscopes** of the autumn equinox, winter solstice, spring equinox, and the summer solstice (see sections 5.5, 5.6, and 5.8).
- **Agreement with Additional Astronomical Symbols and Supplementary Scenes**, which are present on the Egyptian zodiac (see section 5.9).

This verification was conducted with the help of a *Checkup List*, which was set up in a form of a table for every admissible solution. This table had six, or possible even more columns, with the following contents:

(1) **VISIBILITY OF VENUS** in the main horoscope.
(2) **VISIBILITY OF MERCURY** in the main horoscope.
(3) **PARTIAL HOROSCOPE OF THE AUTUMN EQUINOX**.
(4) **PARTIAL HOROSCOPE OF THE WINTER SOLSTICE**.
(5) **PARTIAL HOROSCOPE OF THE SPRING EQUINOX**.
(6) **PARTIAL HOROSCOPE OF THE SUMMER SOLSTICE**.
(7) **SUPPLEMENTARY SCENE OF THE PASCHAL FULL MOON**. This column was reserved only for those zodiacs, where there was a disc in Libra, or other symbols that could be interpreted as representations of the Paschal Moon.

For some Egyptian zodiacs, depending on the presence of the additional astronomical symbols or supplementary scenes, the number of the columns in the checkup table was even further extended.

In each column, we included a short description of the corresponding chart of the sky, related to the examined solution. If the picture on the chart fully agreed with the situation presented on the Egyptian zodiac, the column was annotated with the sign $+$. If the full correspondence between the solution and the zodiac couldn't be confirmed, we annotated the column with the sign $-$. In questionable cases, where some doubt still existed, we annotated such column with the sign $\pm$.

By a **complete** or **ideal** solution we understand such final solution, for which all the columns of its checkup table are annotated with **plus signs** only. Only such solutions were accepted as final solutions, while all other solutions were rejected.

Let us emphasize, that we did not expect in the beginning of our research that it would be possible to find **complete (ideal) solutions for all investigated Egyptian zodiacs**. In fact, it could happen that our requirements were overstated for the actual ability of ancient artists and astronomers to achieve expected from the zodiac accuracy. Clearly, in such case, it wouldn't be possible to obtain ideal solutions for **all the zodiacs**.

On the other hand, if the requirements imposed on an ideal (complete) solutions were **too low**, then at least for some zodiacs there would be more than one ideal solution.

But neither one of these two eventualities occurred in our case. Contrary to our expectations, the results were surprisingly good. For all investigated by us Egyptian zodiacs, always **only one admissible solution turned out to be ideal**. Therefore, we can say that this method allows a **unique dating of practically all Egyptian zodiacs**, except the zodiacs with very poor astronomical content or those that are badly damaged. Moreover, for every investigated zodiac, there were always several solutions satisfying almost all the requirements from the checkup list, with possibly one or two $-/\pm$ annotations. Nevertheless, there was always only one solution with all the plus signs.

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Later, in the subsequent chapters, we will present the checkup tables for all the ideal solutions of the specific Egyptian zodiacs. In this tables we will use the following abbreviations:

1. **SUH** — the submersion of the Sun under the local horizon measured in degrees. For example `SUH=10`^{o} means that the submersion of the Sun was 10^o.
   - The submersion of the Sun is measured at the moment when a planet is raising or setting down over the local horizon (depending on the morning, or respectively, the evening visibility of this planet that is examined). At that moment, if the submersion of the Sun is sufficient, it is possible for an observer to see the planet on the sky. We will always assume that all the submersions of the Sun are calculated for an observer located in Cairo, except the cases when it will be specified otherwise. Let us recall that a planet with an average brightness is visible if the submersion of the Sun is 10^o or more, and a bright planet (with the magnitude $M = -3.5$) is visible if the submersion of the Sun is about 7^o–8^o, or more (see section 6.7, Step 3 [B]).
2. M — the magnitude of brightness of the planet measured according to the photometric scale. For example $M = -3.2$ means that at that moment the brightness of the planet was -3.5. As we explained before, brightness of the planets changes with time.
   - Let us recall that the brightness according to the photometric scale can be possibly expressed by negative numbers — smaller the number, higher the brightness of the planet. The brightest planet is Venus. Its magnitude can reach up to $M = -4$, but the most frequently it is from $M = -3$ to $M = -3.7$. The magnitude from $M = 0$ to $M = +1$ is characteristic not only for the planets but also for bright stars. The planets with such magnitude of brightness are visible on the sky only when it is sufficiently dark. Such conditions exist if the submersion of the Sun is at least 8^o–9^o. Less bright planets can be observed with the naked eye only if the submersion of the Sun is 10^o or more. With the submersion of the Sun of 18^o, there is a complete darkness. At that time it is possible to see faint stars. We discussed this issue in subsection 6.7.3.
3. **Decimal Number** from 0 to 12 in brackets, indicating a position of the planet according to the constellation-sized scale (see section 6.10). For example, (2.5) denotes the middle of Gemini, or a point with the longitude 70^o on the ecliptic J2000, and (0.2) – a point in Aries with longitude 31^o on the ecliptic J2000 (see section 6.10).
4. Sometimes, in a column related to the visibility conditions of a certain planet, we indicate its distance (in degrees) from the Sun, which we denote using the capital Greek letter **delta**: Δ.

We use the last column in the checkup table for comments. At the bottom of this column we placed a sequence of squared boxes, corresponding to the columns in the table. Each of these boxes contains one of the signs $+$, $-$ or $\pm$, depending on how the solutions agrees with the zodiac. If the solution is complete, in all boxes there are only plus signs. In addition to these boxes, we also included there the mean discrepancy from the best points for this solution, which we denoted by the symbol Δ_{av} (see section 6.11).

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Chapter 7

The Dates Shown on the Monumental Zodiacs in the Denderah and Esna Temples

7.1 Denderah and Esna Zodiacs as Parts of the Gigantic Burial Complex in the Great Bend of Nile

Inside of the great bend of the Nile River in Upper Egypt, is located the Valley of the Kings, also called the Valley of the Tombs of the Kings, and the Valley of the Queens. It is surrounded by numerous mortuary temples, and other structures, which form a gigantic burial complex for almost all the Egyptian kings (pharaohs), queens, and members of their families (see Figure 7.1).

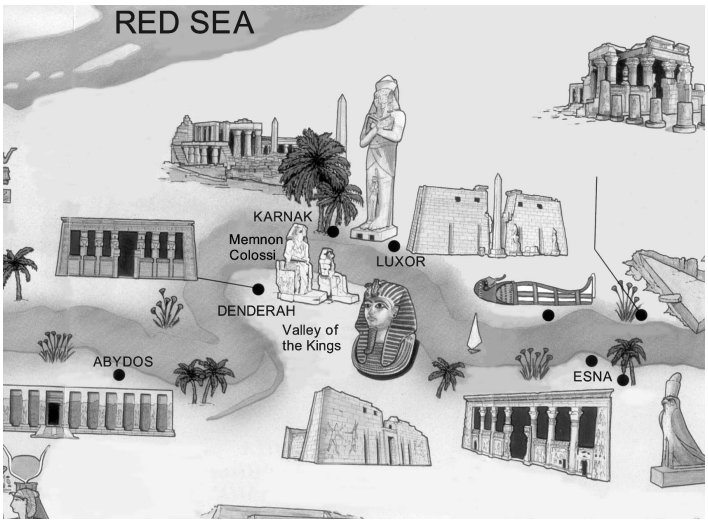

Figure 7.1: *A fragment of a modern tourist map of Egypt showing the surroundings of the Valley of the Kings. This map doesn't show the real orientation of the temples.*

Inside the center of this complex, hidden in inaccessible valleys surrounded by rocky hills, was located the ancient Egyptian necropolis, or the "*city of the dead*" — an area containing many tombs, including royal tombs. In a lonely valley in the western hills behind Dayr al-Bahri, the royal tombs were sunk deep into the heart of the mountain (see Figure 7.2). The long descending corridors leading to the burial chambers were carved in soft rock. The entrances were well concealed (see Figures 7.3, 7.4 and 7.5).

In particular, in the Valley of the Kings the famous Tutankhamen's tomb was discovered in 1922 by Howard Carter. The entrance to this tomb is shown in the center of Figure 7.3.

On the other side of the Nile river, across from the Valley of the Kings, parallel with the bank of Nile there is a gi-

Figure 7.2: *The Valley of the Kings.*

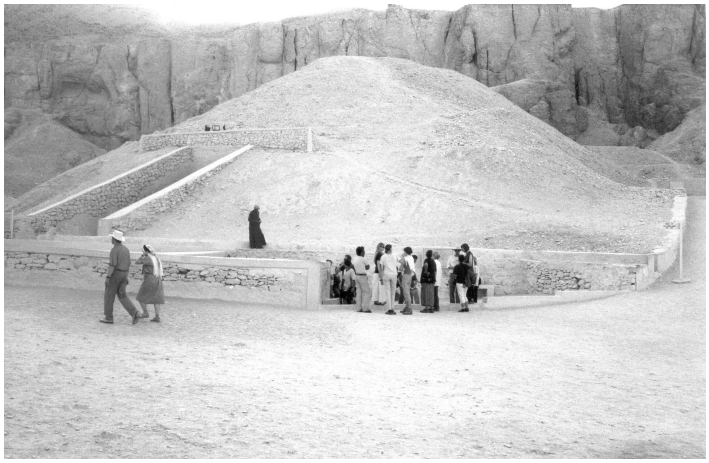

Figure 7.3: *Entrances to the royal tomb of Ramses VI in the Valley of the Kings.*

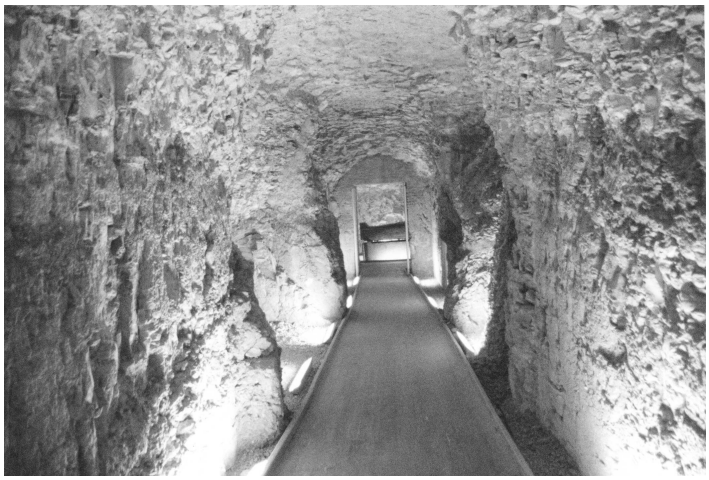

Figure 7.4: *Descending corridor leading to the burial chamber.*

Figure 7.5: *The burial chamber with a stone sarcophagus.*

ant temple, known today as the Temple of Luxor (see Figure 7.7). Couple of kilometers further to the north, also on the east bank of the Nile river, there is located the Great Karnak Temple (see Figures 7.6 and 7.9). These two temples, which were connected by the Sphinx Avenue (see Figure 7.8), constituted the beginning place for the burial rituals. First the body was taken to the Karnak temple, then along the Sphinx Avenue, to the Luxor temple located on the bank of the Nile river, and from there, by boat to the western bank of the Nile. Next, following the road passing by the Memnon Colossi, the body was transported to the desert-mountains, in which lies the Valley of the Kings.

All these temples, buildings and monuments were parts of a giant burial complex surrounding the burial grounds with numerous tombs inside. On the perimeter of this complex were located other temples including the Denderah and Esna temples in which monumental zodiac relieves were discovered. This Chapter is devoted to the detailed analysis and reconstruction of the dates encoded in these zodiacs.

It is important to point out that the Denderah and Esna temples were raised in proximity of the burial complex, what is an indication that they were connected to the burial rituals, and it is possible that these immense zodiacs were placed there to commemorate the deaths of some eminent individuals. It would be interesting to find out to whom these zodiacs were devoted, but it is not our goal to speculate on that subject. We are concerned here only in discovering the encoded dates, which may be helpful later in further investigation of this matter.

As we already revealed, all the dates on the Esna and Denderah zodiacs fall into the period from the 12th to 15th centuries. This implies that the events related to the construction of these temples took place in the middle ages, but this also means that the temples themselves couldn't be build before these dates. However, from the point of view of presently accepted Scaliger's chronology, it is not possible either to accept nor explain these results. On the other hand, the obtained results perfectly fit the revised version of chronology, which was constructed with the use of the empirico-statistical and astronomical methods based on the data retrieved from the collection of written historical documents (see

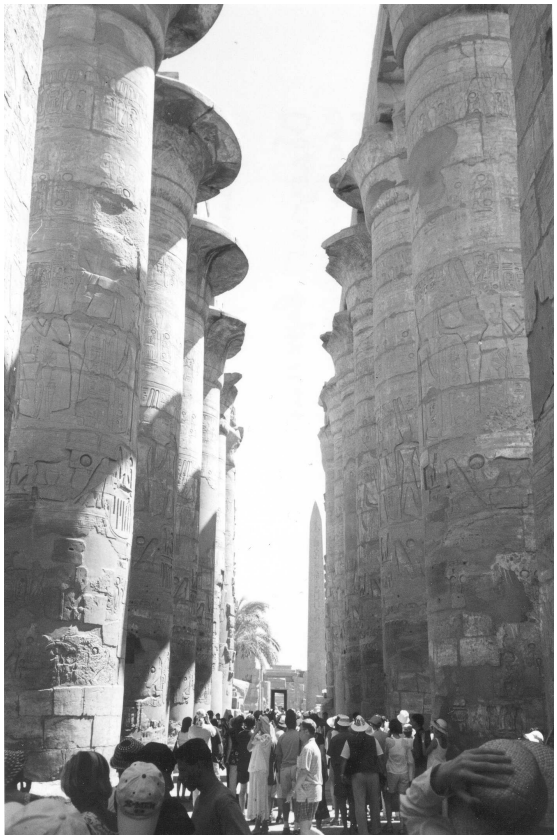

Figure 7.6: *Inside of the Karnak Temple.*

Figure 7.7: *Painting of the Luxor Temple by David Roberts in 1838.* (London, Victoria and Albert Museum. Taken from [116], p. 190)

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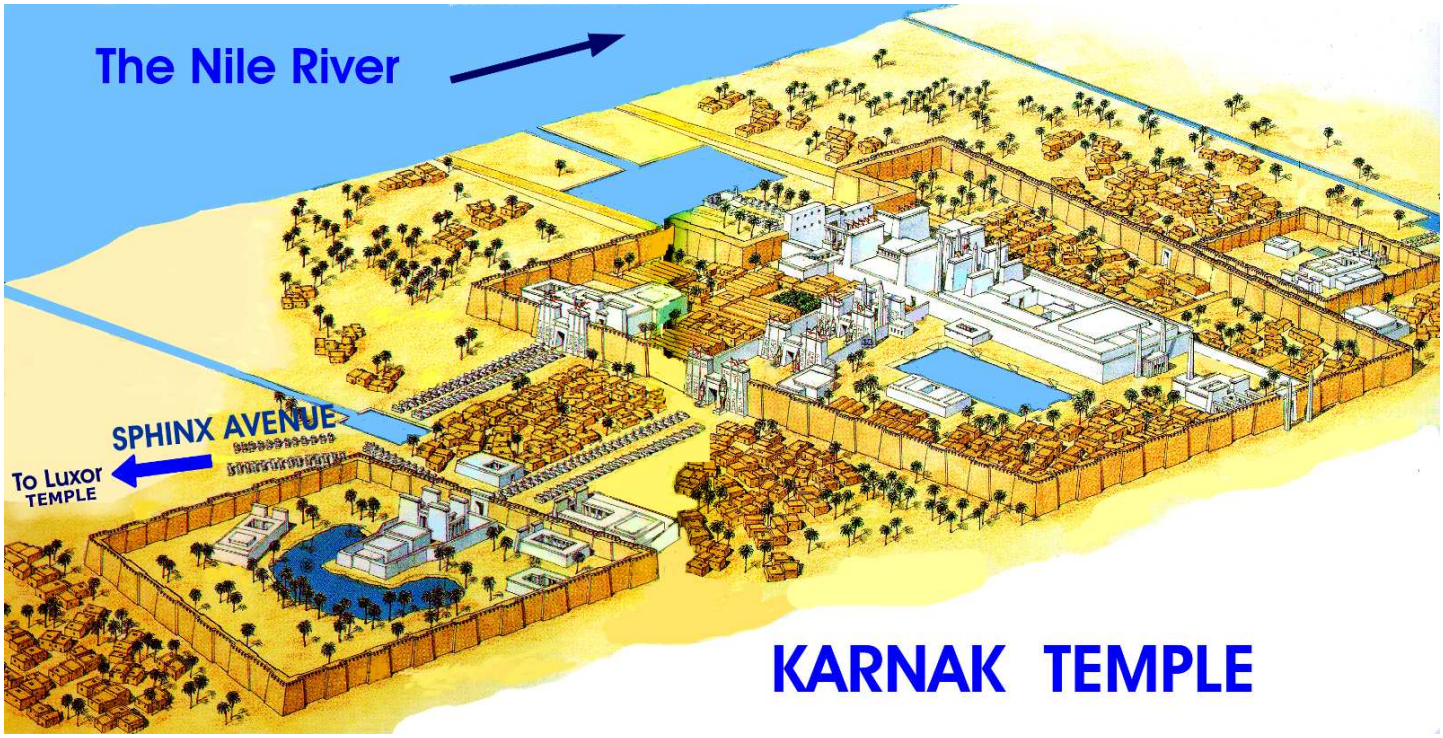

Figure 7.9: *Karnak Temple (reconstruction).* (See [108], pp. 208–209)

Figure 7.8: *The end of Avenue of Sphinx in front of the Luxor temple.* (Taken from [116], p. 191)

Figure 7.10: *A photograph of the ancient Egyptian remains in Denderah*

7.2 sec:0.9

). We refer the interested reader to the books on the *New Chronology* (see [103], [105], [106]) and the related web sites listed in the end of the book.

7.3 Decoding the Date from the Long Denderah Zodiac

The Long Denderah zodiac was shown on Figures 2.8 and 3.3, but in this section we will need a more detailed picture of this zodiac, which will be used to identify all the important features discussed below. Such a picture is presented on Figure 7.11. On Figure 7.12 we present a color-annotated picture (see section 6.8) of the Long zodiac. Let us recall the color convention that we used to annotate the zodiacs:

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- **RED** for the zodiacal constellations;
- **BROWN** for decans (if they are present);
- **YELLOW** for planets in the main horoscope;
- **LIGHT-BLUE** for the partial horoscopes and solstice and equinox symbols;
- **GREEN** for supplementary figures and scenes.

In the case when at the preliminary stage (before the computations) several variants were considered, we use multiple colors.

We will conduct the dating of the Long Denderah zodiac following the steps described in section 6.7.

Step 1. (See subsection 6.7.1.) Decoding of the main horoscope on the Long zodiac and compiling the color annotated zodiac.

By using the comparative tables (see sections 5.1 and 5.4) of the Egyptian astronomical symbols, we found all the symbols of constellations and planets in the main horoscope on the Long zodiac. We indicated them on the color annotated zodiac (see Figure 7.12), to which (as well as Figure 7.11) we will refer implicitly throughout the remaining part of this section.

7.3.1 Constellations Figures on the Long Zodiac

The constellation symbols on Figure 7.12 are marked in red. All the constellations are standard and easy to identify. Our identification is the same as suggested by Egyptologists (see for example [10]), used by N.A. Morozov, and N.S. Kellin and D.V. Denisenko.

7.3.2 Planets in the Main Horoscope on the Long Zodiac

We marked in yellow all the planetary figures in the main horoscope, which consist of all figures equipped with the planetary walking sticks, except those situated on other symbols or simply with their walking sticks placed over other objects. We explained in Chapter 5 that such planetary symbols do not belong to the main horoscope (see section 5.6 about the pull-out symbols). In fact, they either refer to a partial horoscope (colored in light-blue) or are parts of a supplementary scene (colored in green). Let us list all such figures on the Long zodiac.

(1) A girl with a planetary walking stick placed over the back of Capricorn.
(2) A man with a falcon head and holding a planetary walking stick, who is standing on a goose. This figure is located in front of Aquarius close to the edge of the zodiac.
(3) A man holding a planetary walking stick and placed on a boat. This figure is located close to Gemini.
(4) A couple of females standing on a boat, one of them with a planetary stick. This symbol is located behind Gemini close to the edge of the zodiac. Notice that this walking

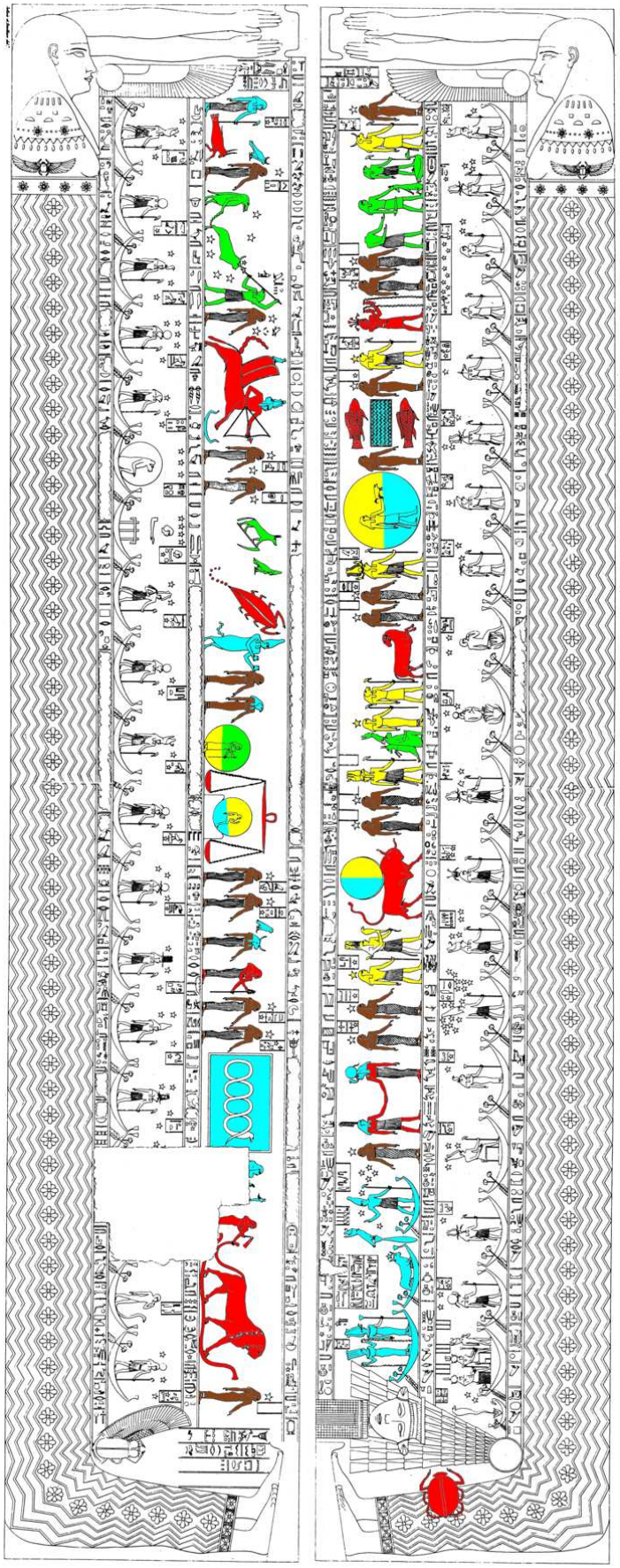

Figure 7.12: *The color annotated Long Denderah Zodiac*

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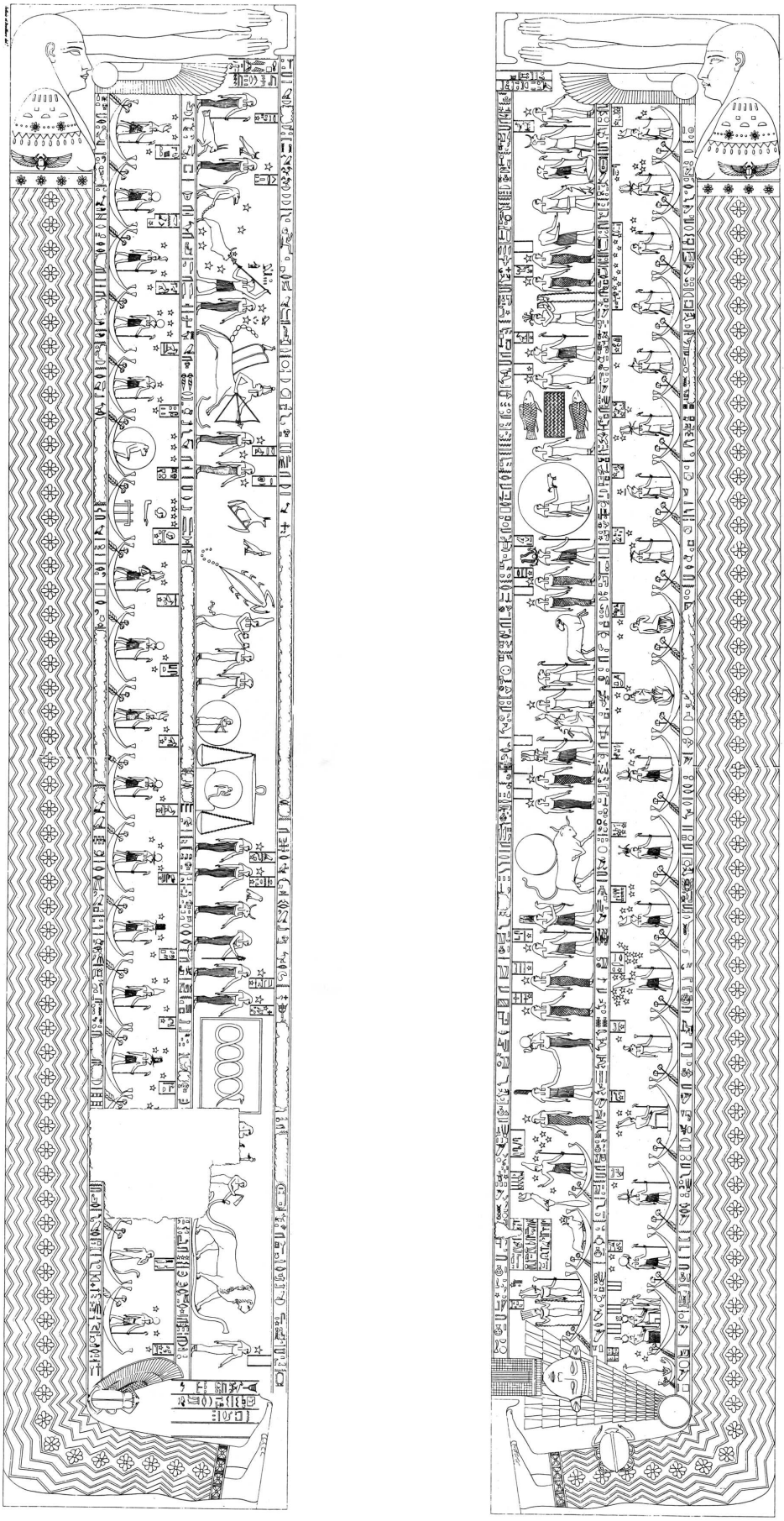

Figure 7.11: *Long Denderah Zodiac.* (Drawing taken from the Napoleonic Album [2], A.Vol.IV, Pl.20.)

stick is slightly different from a typical planetary walking stick on the Long zodiac. Nevertheless, this symbol could be a planet from the main horoscope if it wasn't standing on a boat.

Notice two other female figures with objects resembling walking sticks in their hands. The first one is Virgo holding a spike, and another one is the figure inside the circle beside Libra, holding with both her hands a long stick. This is not a walking stick — a handle on its top is missing. Moreover, on the Long zodiac all the walking sticks are held in one hand. However, any circle could be a representation of the Sun or Moon in the main or a partial horoscope.

All the other figures with planetary walking sticks are marked in yellow to indicate that they are symbols of the main horoscope. These figures are:

(1) **Saturn** — a male figure with a planetary walking stick in front of Aquarius close to the edge of the zodiac. On his head there is a crescent or horns in a shape of a crescent. The explanation why this planetary figure represents Saturn was given in subsection 5.4.2. This figure was also recognized by Egyptologists[1], as well as T.N. Fomenko[2], to symbolize Saturn. N.A. Morozov identified Saturn differently, however, it was a mistake due to an erroneous picture of the Long zodiac he used (see more details in subsection 5.4.2).

Consequently, Saturn on the Long zodiac is shown either in Aquarius or in Capricorn, so only these locations of Saturn are admissible for an astronomical solution. In other words, the range of admissible positions of Saturn is Aquarius and Capricorn.

Saturn, which is located at the very end of this part of the zodiac, is separated from Aquarius by five other figures and it stands beside of a decan of Capricorn. In this way, we will choose the best point for Saturn to be the boundary between Aquarius and Capricorn. Let us recall that the best point is the location of the planet that seems to be indicated on the zodiac. We use the best points to establish the required order of planets and to compute the mean discrepancy, which is not an objective characteristic, but still helpful for approximate comparison of solutions. However, the mean discrepancy plays no role in the elimination process of astronomical solutions (see section 6.12).

(2) **Jupiter** — a male figure wearing a high crown with a planetary walking stick, which is located between Pisces and Aries. Besides of his head, there is a hieroglyphic inscription *"Hor-Apis-Seta*, which accordingly to H. Brugsch means *"Planet Jupiter"*[3].
Our identification of Jupiter on the Long zodiac coincides with the identifications suggested by N.A. Morozov[4], N.S. Kellin and D.V. Denisenko[5], T.N. Fomenko[6], and Egyptologists[7]. We refer to subsection 5.4.4 for more detailed discussion of this symbol.

Consequently, Jupiter on the Long zodiac is either in Pisces or in Aries, so the range of admissible positions of Jupiter is Pisces and Aries.

On the Long zodiac, Jupiter is separated from Pisces by the same number of figures as it is separated from Aries, so we choose as the best point for Jupiter the boundary between Pisces and Aries.

(3) **Mars** — a male figure with a falcon head and a planetary walking stick, which is located between Pisces and Aquarius. Beside his head there is a hieroglyphic inscription *"Hor-Tos*, what H. Brugsch translated as *"Red Planet"*, which is a common name of Mars[8].

Our identification of Mars on the Long zodiac coincides with the identifications suggested by N.A. Morozov[9], N.S. Kellin and D.V. Denisenko[10], T.N. Fomenko[11], and Egyptologists[12]. We refer to subsection 5.4.5 for more detailed discussion of this symbol.

Consequently, Mars on the Long zodiac is either in Pisces or in Aquarius, so the range of admissible positions of Mars is Pisces and Aquarius.

Since Mars is separated from Pisces by a decan figure (belonging to Pisces), but its position is immediately behind Aquarius, we choose its best point to be the middle of Aquarius.

(4) **Venus** — a pair of travelers with planetary walking sticks located in between Aries and Taurus. This symbol consists of a male figure with a lion head in front, followed by a female with a star over her head. Our identification of Mars on the Long zodiac coincides with the identifications of N.A. Morozov[13], N.S. Kellin and D.V. Denisenko[14], and T.N. Fomenko[15], but is different from the identification suggested by Egyptologists[16]. However, in the case of other Egyptian zodiacs, Egyptologists recognize Venus based on the same principles as ours[17]. This problem was already discussed in subsection 5.4.6.

Consequently, Venus on the Long zodiac is either in Aries or in Taurus, so the range of admissible positions of Venus is Aries and Taurus.

[1] See [10].
[2] See [1].
[3] See [4], Vol.6, p. 652.
[4] See [4], Vol. 6.
[5] See [15].
[6] See [1].
[7] See [10].
[8] See [4], Vol.6, p.652.
[9] See [4], Vol. 6.
[10] See [15].
[11] See [1].
[12] See [10].
[13] See [4], Vol. 6.
[14] See [15].
[15] See [1].
[16] See [10].
[17] See [5].

Notice a star sign over the head of Venus, which on the Denderah zodiacs stands for a planetary visibility attribute. Since Venus and Mercury are always in proximity of the Sun, their visibility is an important information. In this case we know that Venus was visible.

Venus is separated from Taurus by two decans and one planetary symbol, but it is located immediately behind Aries. Therefore, we choose its best point in the middle of Aries.

(5) **Mercury** — a two-faced male figure with a planetary walking stick, which is located between Aries and Taurus. There is no star placed over its head, thus it wasn't visible at this position. There is also another location of Mercury indicated on the Long zodiac — a pair of male figures behind Taurus. The first male holds a snake (cobra) and the second one a planetary walking stick. Over the head of the second figure, there is a star — a visibility attribute, so it has all the characteristics of a visible planet from the main horoscope. However, all the planets, except the Sun and Moon, are already identified. But, the Sun and Moon were never represented in the main horoscope by figures of travelers — disks were used for them (see subsections 5.4.11–5.4.13). On the other hand this pair is not far from the planet Mercury, so the only possible variant is that it shows Mercury in another visible position. Indeed, all the other planets are too far from this place, but fast moving Mercury could be located in two different places in short period of time (see subsection 5.4.7). The snake held by the first figure also refers to Mercury (see subsection 5.4.8).

Consequently, Mercury on the Long zodiac is either in the Aries-Taurus area (for the two-faced figure), or in the Taurus-Gemini area (a pair of two travelers), so the range of admissible positions of Mercury is Aries, Taurus, and Gemini.

In choosing the best point for Mercury we try to avoid favoring any of its two representations, so we choose as the best point the middle point in between them, i.e. the center of Taurus.

We finished the listing of all figures with the planetary walking sticks on the Long zodiac. There are no more such figures in its zodiac area (see the colored part on Figure 7.12). It remains to enlist the "planets" represented by the discs, i.e. the Sun and Moon.

(6) **Sun and Moon** — in this case the situation is much more complicated, what is reflected in the works of N.A. Morozov, N.S. Kellin and D.V. Denisenko, T.N. Fomenko, and S. Cauville. Their identifications were completely different. The problem was related to the fact that on the Long zodiac there are four discs, which can all be considered to represent the Sun or Moon, but for the main horoscope we need only two such disks. However, in our approach there this is not an issue. Since we know about the presence of partial horoscopes, we are not worried about too many disks for the Sun and Moon. We solved the problem of finding their right representations by considering all the possible choices for the Sun and Moon, and then by scrutinizing, according to our selection procedure (see section 6.7), all the astronomical solutions obtained for these variants. In this process no particular variant is given a preferential treatment, and its output will be the final solution, which will show us the correct identifications for the Sun and Moon. In the same time all the other discs must be recognized as elements of partial horoscopes.

In the previous attempts to date the Long zodiac, the authors were forced to choose among these four discs the symbols for the Sun and Moon. Any kind of such a choice was more or less arbitrary, and this is the main reason why their final datings were incorrect.

It is easy to locate all the four discs on the Long zodiac, which we marked on Figure 7.12 with either yellow/light-blue or yellow/green colors. The first disc encircling a figure of a child sucking finger, is located inside Libra. The second disc, in which there is a female figure holding a long stick, is situated behind Libra. Inside the third disc, there is a male figure holding a small animal in a gesture of making an offering. It is near Pisces on the same side as Aries. Finally, the last disc is placed on the back of Taurus. This disc contains nothing inside, except a very narrow crescent at the bottom. The presence of a crescent doesn't necessarily mean that it is Moon, it could also be the Sun (see subsections 5.4.11 and 5.4.13). In our computations we have considered all variants, including the possibility of this disc symbolizing the Sun and Moon together.

We had an impression that the best candidates for the Sun in the main horoscope were the disc on the back of Taurus (the variant suggested by N.A. Morozov) or the disc next to Pisces (the variant of T.N. Fomenko). The final result showed that on the back of Taurus is the Sun in the main horoscope, while the disc near Pisces is the Sun in the partial horoscope of the spring equinox.

The ranges of the admissible positions and the best points were determined for each variant separately.

Step 2. (See subsection 6.7.2.) In the First Step, due to uncertainty about the Sun and Moon, we obtained several variants of the main horoscope. For each of these variants we calculated, using the program *Horos*, all the possible dates in the required time range (see section 6.7). All the solutions with the order of planets different from their order on the Long zodiac were rejected (see section 6.7). As a result, we obtained few dozens of preliminary dates distributed randomly over the time interval from 500 B.C. to 1900 A.D. Next, for each of these dates the partial horoscopes and the visibility attributes were checked.

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7.3.3 Partial Horoscopes on the Long Zodiac

The partial horoscopes on the Long Denderah zodiacs were already briefly discussed in section 5.8. In this subsection we will discuss in detail their elements referring to the planets. The symbolism of the equinox and solstice points was already described in sections 4.2, 4.3, and 5.8.

[A] **Partial Horoscope of the Autumn Equinox**: This partial horoscope, if present on an Egyptian zodiac, is always located in Virgo (see section 5.8). On the Long zodiac the planetary symbols of this partial horoscope are shown on Figure 7.13 (see also Figure 5.59).

Figure 7.13: *Planetary elements of the partial horoscope of the autumn equinox on the Long Denderah zodiac*

Right behind Virgo, there is standing its second decan, which is endowed with planetary elements of the partial horoscope. It's easy to notice that this figure is different from the other decan-girls (see subsection 5.5.1). It has a lioness head, which we already know is the symbol of Venus. This is not surprising, because Venus is not far from the Sun, so usually it is present in the partial horoscopes. This decan has also a crescent placed on its head, what means that Moon appeared hear at the autumn equinox. This picture suggests that Moon was in proximity of Venus, because the lioness head and the crescent are connected. The other interpretation of the crescent as a symbol of Saturn has to be rejected, because it would contradict the position of Saturn in the main horoscope (see subsection 5.5.1). Right beside the head of this decan-girl, there is a bird-sun. Similar birds appear in several different places on the Long zodiac, which indicate additional symbolism related to the Sun (see subsection 5.9.2). There are no other additional planetary symbols in this location, even in the partially destroyed part of the zodiac. In particular, there is no indication of Mercury in this partial horoscope. Since Mercury is always close to the Sun, its absence here can only be explained by its invisibility on the equinox date. In conclusion, on the date of the autumn equinox Venus and Moon were visible not very far from the Sun, which was in Virgo, Mercury wasn't visible, and there were no other visible planets in proximity of Virgo.

[B] **Partial Horoscope of the Winter Solstice**: There is abundance of information in this partial horoscope on the Long zodiac (see Figure 7.14), which is located in Sagittarius. The figure of Sagittarius is represented as a complex "astronomical hieroglyph" (see subsection 5.8.2 and Figure 5.69) incorporating the symbols of Sun, Mercury and Venus. In the process of the dating such an "astronomical hieroglyph" does not provide any useful information and it has always the same standard form. However, on the Long zodiac there are other planetary symbols in this partial horoscope, which supply us with non-trivial additional information. Let us first discuss one by one all the symbols standing on the left from Sagittarius. Preceding the last decan of Sagittarius, there is a scene of killing a bull (see section 5.9), which appears in a standard form on many Egyptian zodiacs. Further from Sagittarius, there is the fist decan of Capricorn with a "bird-sun" near its head. The bird has a crescent on its head. This symbol was applied by the author of the zodiac to indicate the special positions of the Sun on the ecliptic, in particular to signal there the presence of additional information. Indeed, right behind this decan there is a female figure resting her planetary walking stick on the back of Capricorn (see Figure 7.14). Here, this female figure is not a decan (see section 5.2), and the planetary walking stick in her hand indicates that she represents a planet. As it is a female, it must be Venus. The presence of a *pull-out* attribute (the walking stick is placed on Capricorn), means that it doesn't belong to the main horoscope, so we have here Venus in the partial horoscope of the winter solstice. Regarding the figure of a bird with a crescent on its head, there are two possibilities. It could symbolize either a crescent of Moon or Saturn. In the second case, the position of Saturn in the main horoscope (in Aquarius or Capricorn) does not contradicts this interpretation.

Let us now move the right side of Sagittarius. The first two figures are a decan of Sagittarius and a decan of Scorpio. Next, there is a wolf standing on a scythe, which is another standard scene (see subsection 5.9.2), accompanied by a "bird-sun" wearing a crown. Further to the right, there is Scorpio, and then an imaginary figure of a half-man half-animal holding two bowls in its hands. The precise meaning of this symbol is unclear, but there are similar symbols with the same bowls on the Small Esna zodiac in the partial horoscopes area (see subsection 7.6.3). Finally, there are two decans of Scorpio. One

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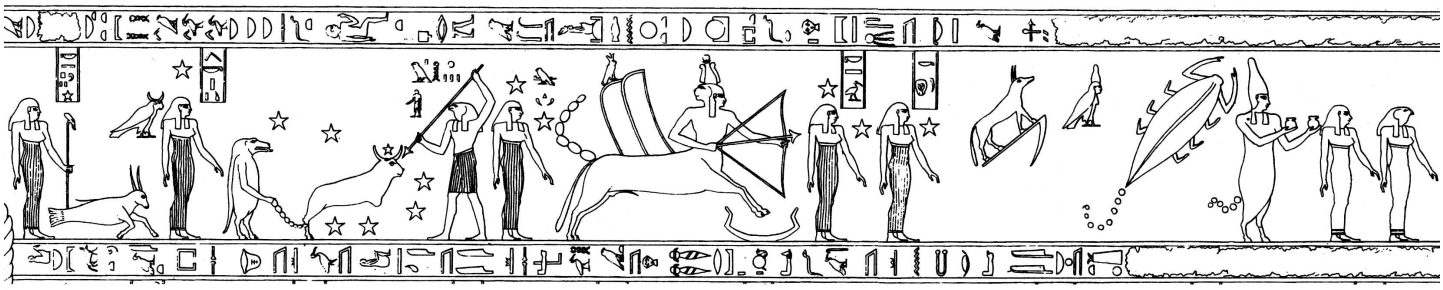

Figure 7.14: *Fragment of the Long Denderah zodiac with the partial horoscope of the winter solstice.*

of them is typical but the other one has a special feature — it has a falcon head. We already met such a modified decan in the autumn equinox partial horoscope, where its lioness head denoted Venus. Since the falcon-headed planetary figure in the main horoscope was recognized as Mars, this attribute symbolizes as well Mars in this partial horoscope.

Consequently, we can assume that on the winter solstice day Mars was in Scorpio or in Libra. The most likely it was on the boundary between Scorpio and Libra (notice that it is incorporated into the last decan of Libra). However, Mars in this position is equally distant from Sagittarius as it is from Virgo, so it could belong to the partial horoscope of the autumn equinox instead.

In conclusion, the partial horoscope of the winter solstice is as follows: Venus and Saturn (or Moon) in Capricorn, Mercury somewhere close to the Sun, which is in Sagittarius, but without clearly specified position, and Mars in Scorpio not far from Libra or in Libra. There were no other planets around the Sun on this day. In the case Mars wasn't there on the winter solstice day, it was in this location on the autumn equinox day.

[C] **Partial Horoscope of the Spring Equinox**: On the Long zodiac the spring equinox is indicated by a rectangular plate with wavy lines placed in Pisces. The only candidate for a planetary symbol in this partial horoscope is the large circle with a male figure inside, but only in the case if this symbol turns out not to be a part of the main horoscope. On the color annotated zodiac (see Figure 7.12) we marked this figure with two colors (light-blue and yellow), to indicate that it could belong either to the main or partial horoscope. There is no other candidate for a planet in this partial horoscope available, because all the figures around Pisces were already recognized as either planets of the main horoscope, or typical decans without any modification. In the case this circle is related to the partial horoscope, it is definitely the Sun. Otherwise, there wouldn't be a partial horoscope here without a symbol of the Sun — its central planet. Regarding the male figure offering an animal inside this circle, it could be a planetary symbol, but without additional attributes it could be any planet except Venus. The only information that we can extract from this symbol is that probably the closest or closest visible planet to the Sun was a male planet.

[D] **Partial Horoscope of the Summer Solstice**: The figure representing Gemini is an "astronomical hieroglyph" incorporating the Sun, Mercury and Venus symbols (see subsection 5.8.4 and Figure **??**). The partial horoscope is placed on the left from of Gemini. Let us discuss one by one all the figures standing in this area. Right beside Gemini, there is the first decan of Cancer looking into the opposite direction. Further, there are the usual symbols of the summer solstice: a man with a raised hand standing on a boat, and a "bird-sun" sitting on a pole. These both symbols represent the Sun in summer solstice (see subsection 5.8.4). The fact that the girl-decan is turned back should not be overlooked. This is the only decan standing this way to indicate that the whole scene in front of her (on the left) belongs to Gemini. If she stood in the same way as all the other decans, this scene would belong to Cancer. We will see that the order of figures in this scene is also reversed. On the first boat there are two female figures, one of them holds a planetary walking stick with a handle, while the other one holds in her raised hands two bowls from which she pours water. There is a similarly to Aquarius. As there is only one female planet, this symbol indicates Venus. On the next boat there is a lying bull, which is a usual symbol of the summer solstice, and then, there is a pole with a sun-bird wearing a crown sitting on its top. Finally, in the last boat there is a man with a raised hand holding a planetary walking stick. This symbol represents the Sun at the summer solstice. The presence of a companion of Venus with Aquarius attributes and the bull, which is the symbol of Taurus, suggest the reversed orientation of this scene on the ecliptic. That means that Venus was in Taurus or in its proximity. In conclusion, Venus was in Taurus or in its vicinity, the exact position of Mercury is not specified, and there were no other planets in the proximity of the Sun on the summer solstice day.

7.3.4 Final Solution for the Long Zodiac: April 22-26, 1168 AD.

Step 3. (See subsection 6.7.3) In this step we validated all the preliminary dates for the Long zodiac ob-

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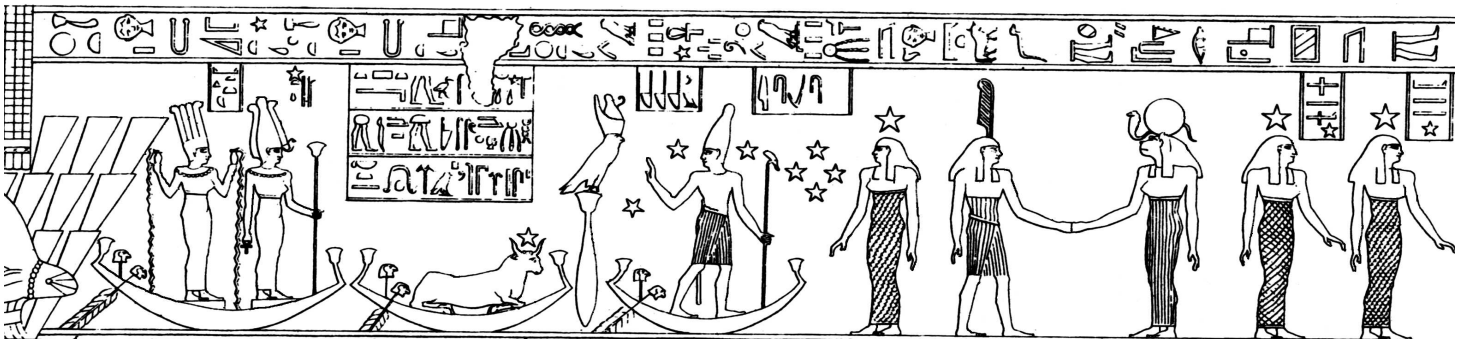

Figure 7.15: *Fragment of the Long Denderah zodiac with the partial horoscope of the summer solstice.*

tained in Step 2. It was done manually using the program *Turbo Sky* written by A.V. Volynkin, however, there are many other good astronomical programs that can be used for this purpose (see for example the site at: `http://www.seds.org/billa/astrosoftware.html`. In this process we examined the planetary positions, the visibility of the planets, and compatibility with the data contained in the partial horoscopes. During this verification all the possibilities for the beginning of the Egyptian year were considered. A precise description of the validation procedure was described in section 6.7. At the end of the selection process we were left with only one *complete* astronomical solution (i.e. a solution, which passed all the tests): **April 22-26, 1168 A.D.** This date indicate the epoch more than thousand years later than claimed by Egyptologists[18]. In the next section we will see that the second zodiac from the same Denderah temple, i.e. the Round Denderah zodiac, shows the date only 17 years different from it. There is another date closely indicating the second half of the twelve century. It's the date (1182 A.D.) shown on the Color Thebes zodiac (OU), which we will analyze and date in Chapter 8. We would like to point out that in spite of the fact that these dates drastically contradict Scaliger's chronology of Egypt, they ideally fit into the new reconstructed chronology of the global history (see [103], [105], [106], [117]).

Let us present the variant of decoding that led to the full astronomical solution for the Long zodiac:

```
--------------- INPUT DATA FOR HOROS ---------------
ZODIAC: The Long Denderah (DL)
DECODING VARIANT: Sun - the disc on the Taurus back,
                  Moon - in Libra
CODE OF THE DECODING VARIANT: DL2

LOCATIONS OF THE PLANETS IN THE MAIN HOROSCOPE:

SUN - the disc on the back of Taurus; Range: from the
middle of Aries to the middle of Gemini; Best Point: the
middle of Taurus.

MOON - the disc in Libra or the disc between Libra
and Scorpio; Range: Libra and Scorpio; Best Point: the
middle of Libra.

SATURN - in Aquarius or Capricorn; Range: Aquarius and
Capricorn; Best Point: the boundary of Aquarius and
Capricorn.

JUPITER - in Pisces or in Aries; Range: Pisces and
Aries; Best Point: the boundary of Pisces and Aries.

MARS - in Pisces or in Aquarius; Range: Pisces and
Aquarius; Best Point: the middle of Aquarius.

VENUS - in Aries or in Taurus; Range: Aries and Taurus;
Best Point: 0.3 of Aries.

MERCURY - in Aries, in Taurus or in Gemini; Range:
Aries, Taurus and Gemini; Best Point: the middle of
Taurus.

We admit 5° tolerance for all the boundaries of the
planetary ranges.

ORDER OF PLANETS ON THE ECLIPTIC (starting from the
autumn equinox point in Virgo, in the direction of the
increasing longitude):
MOON, SATURN, MARS, JUPITER, VENUS, MERCURY <-> SUN
Mercury is interchangeable with the Sun (it is
represented on the both sides of the Sun).

----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
      0.5   6.0    9.0    11.0   10.0   0.0    0.0 # TO:
-----------------------------------------#
      2.5   8.0   11.0     1.0   12.0   2.0    3.0
# BEST POINTS: ----------------------------------#
      1.5   6.5   10.0    12.0   10.5   0.3    1.5
--------------------END OF DATA---------------------


REMARK: The following constellation scale was used (see
section 6.10):
<0>ARIES<1>TAUR<2>GEMINI<3>CANCER<4>LEO<5>VIR<6>
LIB<7>SCORP<8>SAGITT<9>CAPRIC<10>AQUA<11>PISC<12=0>
```

[18] See [10].

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The best correspondence between the calculated planetary positions and the data of the main horoscope, according to the mean distance from the best points, is achieved at the Full Moon on April 23, 1168 A.D. On this day the mean distance was minimal and equal only 12^o, which is about one third of the average length (along the ecliptic) of the zodiacal constellations. Recall, that precision of the symbolic zodiacal scale can not be higher than half of the length of a zodiac constellation, which in average is 15^o, so the expected accuracy from an astronomical solution can not be higher than this. From this point of view, the date of April 23, 1168 AD, is very accurate. However, any other date from the interval April 22 – 26, 1168 A.D., is also acceptable.

We present the exact positions of the planets on the ecliptic for the dates April 22, 23, 26, 1168 AD, in Table 7.1.

In Table 7.1, beside the usual dates we also include the day numbers (JD) in the so called "Julian period," which are commonly used in astronomical calculations[19]. The planetary positions on the ecliptic are given there in three ways:

- Computed longitude J2000 (which is the elliptical longitude with respect to the equinox points for the epoch 2000) — in degrees;
- Coordinate on the constellation scale (see section 6.10).
- Name of the constellation where the planet appeared (for rough idea).

Julian day (JD) = 2147782.00 Year/Month/Day = 1168/4/22						
Moon	Saturn	Mars	Jupiter	Venus	Mercury	Sun
212.7^o 5.93	327.0^o 9.91	330.8^o 10.07	361.2^o 11.37	39.3^o .51	43.2^o .67	50.4^o .95
Vir/Lib	Cap/Aqu	Aqu/Cap	Pisces	Aries	Aries	Ari/Tau
Mean Distance from the Best Points= 13.7^o						
Julian day (JD) = 2147783.00 Year/Month/Day= 1168/4/23						
Moon	Saturn	Mars	Jupiter	Venus	Mercury	Sun
225.1^o 6.45	327.0^o 9.91	331.5^o 10.12	361.4^o 11.37	38.8^o .49	42.7^o .65	51.4^o 1.01
Libra	Cap/Aqu	Aquar	Pisces	Aries	Aries	Ari/Tau
Mean Distance from the Best Points= 11.7^o						
...						
Julian day (JD) = 2147786.00 Year/Month/Day = 1168/4/26						
Moon	Saturn	Mars	Jupiter	Venus	Mercury	Sun
261.4^o 7.83	327.2^o 9.91	333.6^o 10.24	362.0^o 11.39	37.5^o .44	41.5^o .60	54.2^o 1.07
Scorp	Cap/Aqu	Aquar	Pisces	Aries	Aries	Taurus
Mean Distance from the Best Points= 15.8^o						

Table 7.1: *Complete Solution for the Long Denderah Zodiac in the Main Horoscope*

7.3.5 Check-up list for the Long Zodiac Final Solution

In this subsection we will present the verification process applied to the final solution obtained for the Long Denderah zodiac. We should remind that all the other preliminary solutions obtained in the first step were rejected using this validation process. All the preliminary solutions can be easily generated using the program *Horos*, and an interested reader can check by himself/herself their compatibility with the additional data (which was specified in subsections 7.3.2 and 7.3.3) by following our example.

Let us recall that the goal of the check-up list is to compare the astronomical information decoded from the zodiac with the actual astronomical situation associated with the calculated solution. A calculated solution is called full or complete if all the items from the check-up list can be confirmed (see section 6.14). On Figure 7.16 we show the check-up list for the solution April 22-26, 1168 A.D., for the Long zodiac, which turned out to be the only final solution for this zodiac. In this table we used the symbol of an encircled sign *plus* to indicate that the correspondence between the particular information on the zodiac and the solution can be confirmed.

[19] See [27], p. 316, also see section 6.4.

Recall that in our check-up list we use the following abbreviations:

- SUH — the submersion of the Sun under the horizon measured in degrees (in direction perpendicular to the horizon).
- M — the brightness of the planet (which can changes in time) measured in magnitude at the specified moment. In the case the value of M is zero, the planet is quite bright. For negative values of M the brightness increases. See subsection 6.7.3.
- A decimal number in brackets ranging from 0 to 12 — the calculated longitude of the planet with respect to the constellation scale (see section 6.10). For example, (2.5) means the middle of Gemini or in another words, the point on the ecliptic J2000 with longitude 70^o.
- Δ — a spherical distance (measured in degrees).

We will discuss, column-by-column, all the items in the check-up list:

Column 1: VISIBILITY OF MERCURY. On the days specified in the solution, Mercury was surely invisible in Cairo and Luxor. In the check-up list we include the SUH (the submersion of the Sun) in Cairo. In Luxor this number couldn't

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Figure 7.16: *Check-Up List for the final solution for the Long Denderah Zodiac: April 22-16, 1168 AD.*

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be higher more than 1^o, so it wouldn't change the invisibility conditions. Indeed, on April 22, 1168 A.D., which is the first day of the solution, the submersion of the Sun at the moment when Mercury was rising, was only 4^o in Cairo and less than 5^o in Luxor. In the same time, the brightness of Mercury was very low $M = +3.3$, so it wasn't possible to observe Mercury in these conditions. On the last day of the solution, which was April 26, 1168 A.D., the submersion of the Sun was 6^o in Cairo and not more than 7^o in Luxor. At that time the brightness of Mercury was little bit higher ($M = +2.1$) but still insufficient for the visibility in such conditions. Consequently, Mercury was invisible at all the days of the solution, and we can conclude that in this solution, Mercury must be represented by the two-faced figure between Aries and Taurus. Recall that this figure of Mercury has no star over his head, which means it was in invisible position. Moreover, the position of Mercury in the solution was in the middle of Aries, what ideally corresponds to the location of this figure on the Long Zodiac. In this case, the second figure of Mercury should either belong to the partial horoscope of the summer solstice, in which area it shown, or it simply represents a separate supplementary astronomical scene. Notice that such scenes are present on the Long zodiac. For example, there is a scene, that we will discuss below, showing Mars on a goose approaching Saturn. In any case in this solution, the second figure of Mercury can not belong to the main horoscope, because on April 22–26, 1168, Mercury stayed in Aries, while the second Mercury is shown in Taurus. Moreover the second one is not on the same side of the Sun as in the solution. That means, the second figure of Mercury should be included in the other category of the check-up list. We closed this column with an encircled sign plus to signal that all these condition is fully satisfied by the solution.

Column 2: VISIBILITY OF VENUS. On the Long zodiac, the figure representing Venus has a star over its head, which means it was visible. On all the days included in the solution, Venus was clearly visible in the morning. On April 22, 1168, when Venus was rising, the submersion of the Sun was SUH=10^o in Cairo, and the brightness of Venus was high $M = -2.8$, so Venus was very well visible. On April 26, 1168, which is the last day in the solution, the visibility conditions were even better. The submersion of the Sun was SUH=12^o and the brightness of Venus was $M = -3.7$. That means Venus was perfectly well visible in the mornings on all days specified in the solution. In the solution, Venus was in the middle of Aries, while Mercury was also in Aries not far from Venus on the Taurus side. This configuration corresponds perfectly to the astronomical picture on the Long zodiac. Again, we marked this column with the plus sign to show that the specified condition was satisfied.

Column 3: PARTIAL HOROSCOPE OF THE AUTUMN EQUINOX. The variant of the beginning of the Egyptian year was determined through the verification process. It turned out that it was in September, so the year related to the solution started in September 1167 and ended by September 1168 (see section 5.11). This choice of the beginning of the year fits well not only the Long zodiac, but practically all the Egyptian zodiacs (with one exception). Therefore, the autumn equinox for this solution occurred in September 1167.

Let us remark that we can not expect from the creators of the Long zodiac the precise determination of the dates of the equinoxes and solstices. It is not an easy task and even in the 14th century the errors of up to six days were made[20]. The exact date of the autumn equinox in the year 1167 was on September 11-12 (see Appendix **??**). By assuming a six days margin of error, we obtain the interval September 5–18, 1167 for checking the planetary positions in the partial horoscope of the autumn equinox. The six day discrepancy from the exact date of the autumn equinox is significant only for Moon and possibly for Mercury. With respect to other planets (which are relatively slow) these few days make no difference.

Let us indicate the planetary positions in the period September 13–15, 1167 (see Table 7.2):

Julian day (JD) = 2147560.00 Year/Month/Day = 1167/9/13						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
188.1^o 5.93	168.4^o 9.91	309.3^o 10.07	324.4^o 11.37	178.9^o .51	209.3^o .67	179.6^o .95
Julian day (JD) = 2147561.00 Year/Month/Day= 1167/9/14						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
189.1^o 5.36	181.2^o 5.16	309.2^o 9.27	324.3^o 9.81	179.5^o 5.12	210.5^o 5.88	178.9^o 5.11
Julian day (JD) = 2147562.00 Year/Month/Day = 1167/9/15						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
190.1^o 5.38	193.8^o 5.47	309.2^o 9.27	324.3^o 9.81	180.2^o 5.14	211.8^o 5.91	178.4^o 5.09

Table 7.2: *Planetary Positions in the Period September 13–15, 1167*

Using *Turbo-Sky* program we've calculated that the New Moon appeared on September 17, 1167, at the distance 0.5^o from Venus. It became visible in evening on September 17, when it moved a little bit away from Venus, but it was still very close to it (see Figure 7.17).

On the days of the autumn equinox, on the evening sky one could observe very bright Venus and no other planets around. On September 17, the New Moon appeared beside Venus. Before dawn there were no visible planets near the horizon. Mars and Mercury were too close to the Sun to be visible. This situation matches perfectly the information from the partial horoscope of the autumn equinox, i.e. on that date

[20] See [121].

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Venus and Moon were visible not very far from the Sun, which was in Virgo, Mercury wasn't visible, and there were no other visible planets in proximity of Virgo.

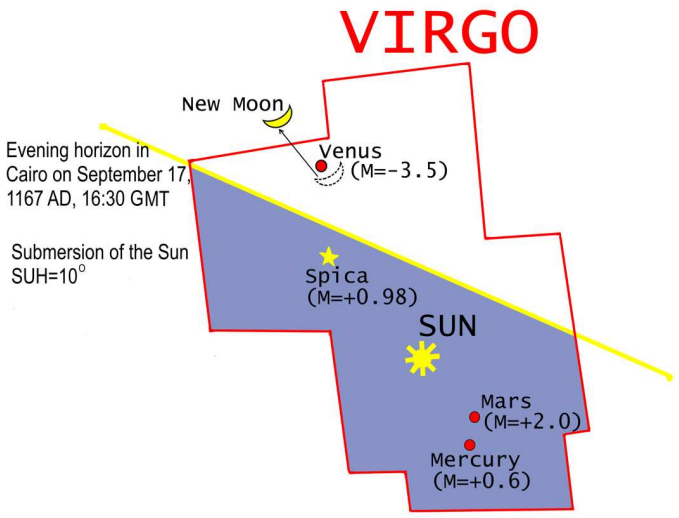

Figure 7.17: *A drawing showing planets in the proximity of the Sun on September 17, 1167 — the day of appearing of the New Moon following the autumn equinox. The sky under the horizon is marked in blue. GMT stands for the Greenwich Mean Time.*

In conclusion, we again should annotate the third column with the sign plus to indicated that all the conditions specified on the partial horoscope of the autumn equinox are satisfied by the solution.

Julian day (JD) = 2147652.00 Year/Month/Day = 1167/12/14						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
280.8^o 8.41	292.1^o 8.73	314.0^o 9.44	331.8^o 10.13	239.8^o 7.11	321.9^o 9.72	297.9^o 8.90
Julian day (JD) = 2147653.00 Year/Month/Day= 1167/12/15						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
281.8^o 8.44	304.2^o 9.09	314.1^o 9.45	332.0^o 10.14	240.5^o 7.13	323.0^o 9.77	298.0^o 8.90

Table 7.3: *Planetary Positions in the Period December 14–15, 1167*

Column 4: PARTIAL HOROSCOPE OF THE WINTER SOLSTICE. In the year associated with the solution the winter solstice took place on December 11-12, 1167 (see Appendix **??**). We have to take into account that in old times the exact day of the winter solstice was the most probably determined with some error. By the same reasons as before, we admit a six days error margin for and consider the winter solstice days to be from December 5 to December 18, 1167.

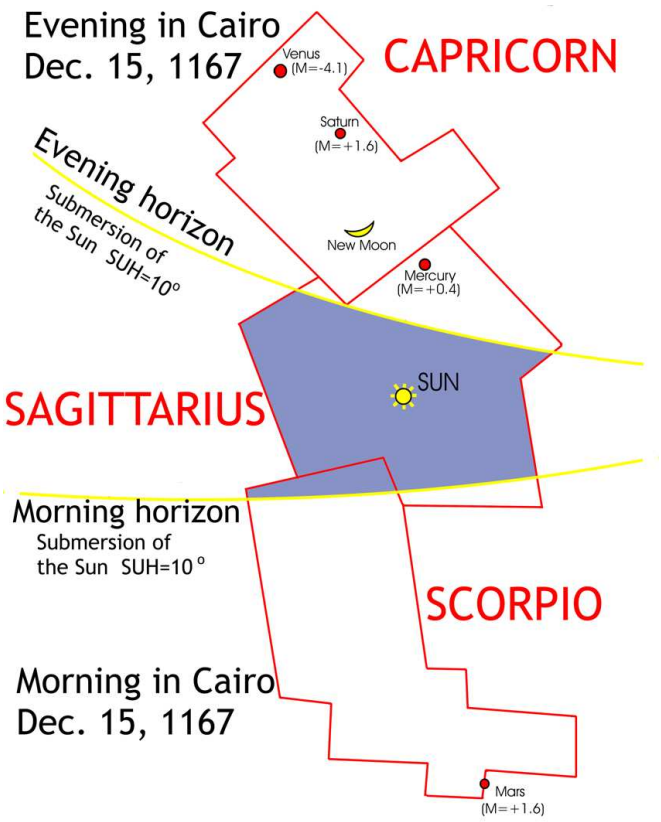

Figure 7.18: *A drawing showing planets in the proximity of the Sun on December 15, 1167 (the day of appearing of the New Moon) at 4:00 GMT and 15:50 GMT. The sky under the horizon is marked in blue.*

To give an idea about the planetary positions around the Sun during the winter solstice period, we choose two dates, for example December 14-15, 1167, and list their longitudes in Table 7.3.

As usual, the same positions are given twice, in the first row we show the longitude in degrees on the ecliptic J2000, and in the second row the same positions according to the constellation scale (see section 6.10).

By using *Turbo-Sky* we obtained that on December 15, 1167, in Cairo, the New Moon appeared in Capricorn. At that day, at the evening twilight, an extremely bright Venus ($M = -4.1$) and relatively bright Saturn ($M = 1.6$), were also visible in Capricorn. Bright Mercury ($M = +0.4$) could be seen near horizon in Sagittarius, and there were no other planets in the evening twilight zone. Before the dawn, only Mars was visible on the boundary between Scorpio and Li-

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bra. It was sufficiently far from the Sun and rather bright ($M = +1.6$), so it was very well visible. The twilight sky on this day in Cairo is shown on Figure 7.18. This configuration of planets around the Sun corresponds exactly to the picture of the partial horoscope of the winter solstice on the Long zodiac: Venus and Saturn or/and Moon in Capricorn, Mercury somewhere close to the Sun, which is in Sagittarius, but without clearly specified position, and Mars in Scorpio not far from Libra or in Libra.

Consequently, we can annotate this column with the plus sign to indicated that considered here requirements are all satisfied.

Column 5: PARTIAL HOROSCOPE OF THE SPRING EQUINOX. In 1168, the spring equinox occurred on March 13 (see Appendix **??**), which was very close date to the date of the main horoscope in this solution. We consider as the spring equinox days the interval March 7–20, 1168, which is exactly 6 days around the equinox date. Let us present the positions of the planets near the Sun on the day of the New Moon on March 12, 1168 (see Table 7.4).

Julian day (JD) = 2147741.00 Year/Month/Day = 1168/3/12						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
370.4^o 11.60	383.6^o 11.93	324.1^o 9.80	352.3^o 11.14	301.9^o 9.01	48.9^o .90	380.8^o 11.86

Table 7.4: *Planetary Positions on March 12, 1168*

Since the spring equinox day happened so closely to the date of the main horoscope, which was April 22–26, 1168, all the planets at that time (except the Sun and Moon) were still near in the same positions on the main date. Maybe because of it, the partial horoscope of the spring equinox on the Long zodiac is very laconic. There is only shown the Sun as big circle in Pisces.

Before the dawn on March 12, 1168, the submersion of the Sun at the moment Jupiter was rising was 15^o, so Jupiter was very well visible. Its brightness was maximal ($M = -1.5$) and it was located in Pisces, i.e. in the same constellation as the Sun. At the evening twilight, Venus ($M = -4.9$) and Mercury ($M = -0.1$) were visible. Their brightness was almost maximal. Venus was in Aries and Mercury in Pisces. At the moment Mercury was crossing the horizon, the submersion of the Sun was about 11^o, thus Mercury was definitely visible. At that time the distance from Venus to the Sun was almost maximal — about 40^o. In the evening on March 13, 1168, the New Moon appeared on the boundary between Pisces and Aries. However, on the Long zodiac, the partial horoscope of the spring equinox consists solely of a big disc representing the Sun with a male figure inside making an offering of an animal. On the Round Denderah zodiac we also have a similar situation, where the partial horoscope of the spring equinox contains only a disc of the Sun. These two cases suggest that the spring equinox was represented differently from other solstice and equinoxes points. We will see later on other examples, that it was typical for Egyptian zodiacs to practically ignore the partial horoscope of the spring equinox.

In relation to the presence of additional figure inside the disc of the Sun (in the partial horoscope of the spring equinox) on each of the two Denderah zodiacs, we notice that it is a male figure on the Long zodiac and a female figure on the Round zodiac. The most probably, this figure represents a planet, which at that time was making "offering" to the Sun. On the Long zodiac, this disc of the Sun almost touches the figure of Jupiter in the main horoscope, what suggests that Jupiter was the planet making an "offering," and indeed, Jupiter was the brightest planet visible near the Sun on the equinox day. Of course Venus as always was much brighter than Jupiter, but it was also much further away from the Sun (40^o for Venus and 15^o for Jupiter). In the case of the Round zodiac, the brightest planet near the Sun on the spring equinox day was Venus, which matches the female figure inside the disc. Consequently, the astronomical situation at the spring equinox fits well the symbolism on the Long zodiac, so we can annotate the fifth column with the sign plus.

Column 6: PARTIAL HOROSCOPE OF THE SUMMER SOLSTICE. In the year 1168, the summer solstice occurred on June 12. As before, we extend the time interval of the summer solstice by 6 days from each side, i.e. we consider as the summer solstice dates June 6–18, 1168. In this case, the time difference between June 6 and June 18 can have an impact only on the position of Moon.

Let us list the positions of the planets on the ecliptic on one of the summer solstice days, for example June 14, 1168 (see Table 7.5).

Julian day (JD) = 2147835.00 Year/Month/Day = 1168/6/14						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
101.1^o 2.40	194.0^o 5.47	327.1^o 9.91	369.0^o 11.56	366.1^o 11.49	55.9^o 1.11	99.5^o 2.34

Table 7.5: *Planetary Positions on June 14, 1168*

Using the program *Turbo-Sky*, we found that the New Moon appeared in Cancer on June 9, 1168. The positions of the planets near the Sun, as it was observed from Cairo on June 8, 1168, are shown on Figure 7.19. This drawing was made with a help of the program *Turbo-Sky*. It illustrates the sky around the summer solstice point with the morning horizon for June 8, 1168, indicated. Before the dawn on all these summer solstice days Venus, which was located on the bound-

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ary between Aries and Taurus, was very bright ($M = -4.7$) and well visible. On June 8, 1168, bright Mercury ($M = 0.0$) could be still visible in Taurus, but the next day it disappeared in the sunlight. No other planet around the Sun, except Moon, was visible during the summer solstice days, neither before the dawn nor at the evening.

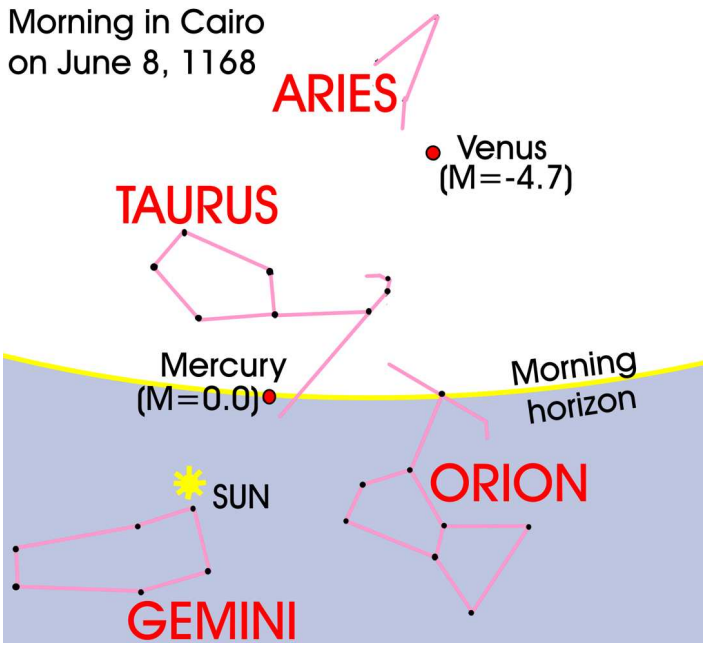

Figure 7.19: *A drawing showing planets in the proximity of the Sun on June 8, 1168. The sky under the horizon is marked in blue.*

Let us recall that on the Long zodiac in the partial horoscope of the summer solstice Venus was in Taurus or in its vicinity, the exact position of Mercury was not specified, and there were no other planets in the proximity of the Sun. Moreover, the second figure representing Mercury, according to the solution, doesn't belong to the main horoscope, so it should be an element of the partial horoscope of the summer solstice. In this case the position of Mercury can be described as located in between Taurus and Gemini. Indeed, the figure of the second Mercury stands just behind Taurus preceding the first decan of Gemini (see Figures 7.11 and 7.12). On the other hand, Venus on the Long zodiac is represented by a couple of female figures on a boat (see Figures 7.11 and 7.12) at the very end of the zodiac. As it is located much further from Gemini than Mercury (remember that this part of the Long zodiac has reversed order), Venus was probably somewhere around Taurus.

In the solution, Venus is located on the boundary between Aries and Taurus. As we can see, all the details related to the positions of the planets on the partial horoscope are in the exact correspondence with the astronomical situation according to the solution. The only discrepancy could be the absence of Moon in the partial horoscope. However, it is not unusual even common that Moon wasn't shown on the Egyptian zodiacs in the partial horoscopes. Let us point out that the New Moon in the summer solstice days appeared in Cancer on the evening sky, but the area corresponding to Cancer was not displayed on the partial horoscope (see subsection 7.3.3(D)), where only the morning sector between Taurus and Aries was included. This was possible to achieve by reversing the order of the procession on the left from Gemini (see subsection 7.3.3(D)). In summary, we can conclude that we have a full correspondence between the solution and the partial horoscope of the summer solstice, thus we can again annotate the sixth column with the plus sign. That completes the comparison of the solution with the data provided by the partial horoscopes. There are only supplementary scenes left.

Column 7: SUPPLEMENTARY SCENE OF THE PASCHAL FULL MOON. We've already discussed in section 5.9 that some Egyptian zodiacs have a special representation of the Paschal Full Moon in the year related to the main date. The first Full Moon after the spring equinox, i.e. the Paschal Full Moon, occurred on March 26, 1168, in Libra. On the Long zodiac, on the left side of Libra there is located the last (fourth) circle, which still remains unexplained. This circle almost touches Libra. There is female figure holding a long stick in both hands. This circle ideally fits the Paschal Full Moon and the figure inside very well agrees with the description of Passover given in Bible: *"And thus shall ye eat it; with your loins girded, your shoes on your feet, and your staff in your hand; and ye shall eat it in haste: it is the Lord's Passover."*[21], so the person standing with a walking stick (or stuff) is a good symbol for Passover.

As we were able to associate a reasonable explanation with the forth circle, we can annotate this column with plus.

Column 8: OTHER SUPPLEMENTARY SCENES. The last supplementary scene that we are considering is the figure of Mars standing on a goose. It is located in between the first decan of Aquarius and the third decan of Capricorn, at the very end of the zodiac. In this scene Mars makes an impression of approaching Saturn. However, here there is no new information to be obtained. Saturn moves very slowly and during the whole year its position changes so little that the same figure on the zodiac could describe all of them. In the same time Mars is relatively fast planet, and by knowing its position in the main horoscope, which was in between Pisces and Aquarius, we can be certain that at some moment during that year it passed by Saturn.

Nevertheless, this particular information fits exceptionally well the solution, because on April 16, 1168, when Mars was passing Saturn the distance between them (in latitude) was only $40'$ (this value was calculated using *Turbo-Sky*). Let us notice that this meeting took place just 6 days before the date of the main horoscope, and possibly that's why this scene was included in the Long zodiac.

[21] Exodus 12:11.

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So, we've managed to verify that the solution satisfies all the additional information on the Long zodiac, and in result we determined that this solution is a full (complete) solution. No other full solution was found for any admissible variant of decoding of the Long zodiac (see subsection 7.3.2).

CONCLUSION: The Long Denderah zodiac represents the date April 22-26, 1168 AD.

7.4 Decoding the Date from the Round Denderah Zodiac

In this section we will calculate the date represented on the Round Denderah zodiac. Recall, that the Round and Long zodiacs were discovered in the same temple in Denderah.

In Chapter 1 we presented several pictures of the Round Denderah zodiac (see Figures 2.4–2.7), but here we will need a more detailed picture of the central part (the main area of the zodiac) showing the zodiacal constellations and the horoscope (see Figure 7.20). This drawing, which was taken from [10], was made based on the actual photograph of the Round zodiac. We will implicitly refer to this picture throughout all the discussion in this section.

In our investigation we have also used a set of photographs of the original Round Denderah zodiac taken by Prof. Y.V. Tatarinov in Louvre (France). Comparing the photos with the drawing on Figure 7.20, led us to a conclusion that this drawing is very precise in all aspects, including the exact location and configuration of all the symbols, what is very important for the correct decoding of the Round zodiac. Contrary to the Long zodiac, the figures here are not arranged in processions, but they are organized in two-dimensional formations, where any small detail may turn out to express some important astronomical information.

We will again describe the process of dating of the Round zodiac following several steps (see section 6.7).

Step 1. (See subsection 6.7.1.) Preliminary decoding of the main horoscope on the Round zodiac and compiling the color annotated zodiac.

By using the comparative tables (see sections 5.1 and 5.4) of Egyptian astronomical symbols, we found all the symbols of constellations and planets in the main horoscope on the Round zodiac. On the color annotated zodiac, shown on Figure **??**, these constellations are marked in red and the planets in the main horoscope in yellow. Similarly to the Long zodiac, here again the main problem leading to several variants of decoding, is the recognition of the Sun and Moon.

7.4.1 Constellations Figures on the Round Zodiac

The symbols used here to denote the zodiac constellations are standard and almost identical with the corresponding symbols on the Long zodiac. Consequently, it is straight forward to identify all these constellations and our identification is the same as suggested by Egyptologists[22], used by N.A. Morozov[23] , N.S. Kellin and D.V. Denisenko[24] , and T.N. Fomenko[25].

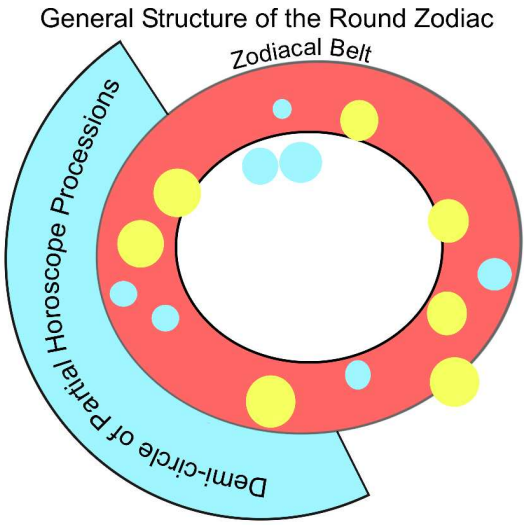

Figure 7.22: *Diagram showing the general structure of the Round Denderah zodiac. The zodiacal belt is indicated by red, elements of partial horoscope are marked in light-blue, and the elements of the main horoscope in yellow. Notice the demi-circle composed of the partial horoscope symbols only.*

On the color-annotated zodiac (see Figure 7.21), we can see the general composition of the Round zodiac. All the zodiacal constellations are arranged in a form of a slightly deformed circle, which represents the zodiacal belt on the sky. It is surrounded from one side by processions of figures belonging to the partial horoscopes of the autumn equinox and summer solstice (marked in light-blue). The figures belonging to the other two partial horoscopes are located inside the zodiacal belt.

7.4.2 Planets in the Main Horoscope on the Round Zodiac

As usual, the planetary figures in the main horoscope are marked in yellow on the color-annotated zodiac. All the planets in the main horoscope are represented by figures equipped

[22] See [10].
[23] See [4], Vol. 6.
[24] See [15].
[25] See [1].

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Figure 7.20: *Central fragment of the Round Denderah zodiac with the constellations and horoscope.*

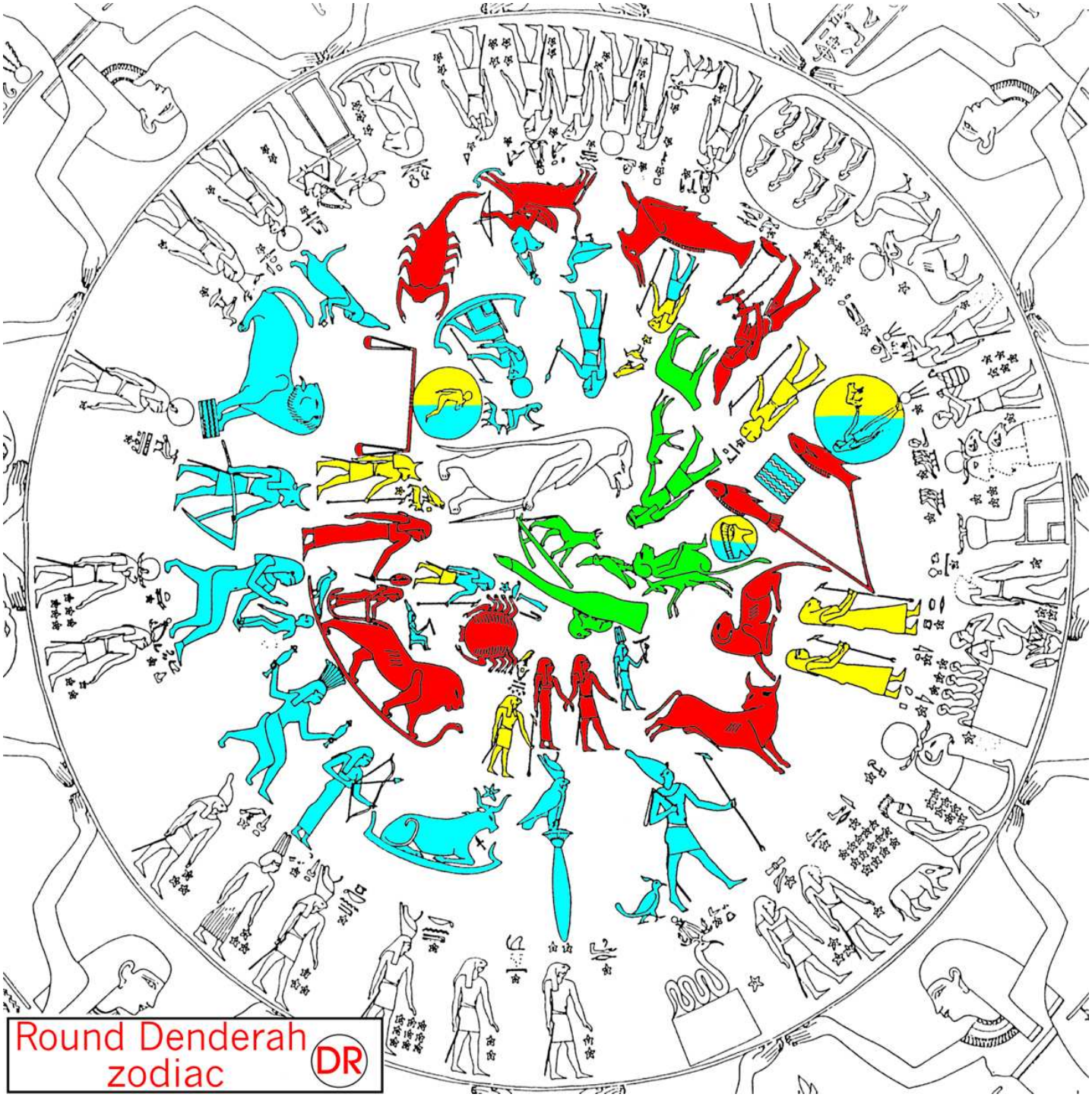

Figure 7.21: *The color-annotated Round Denderah zodiac. Meaning of colors: RED– zodiacal constellations, YELLOW – planets in the main horoscope, LIGHT-BLUE – partial horoscopes and solstice and equinox symbols, and GREEN – supplementary figures and scenes.*

with the planetary walking sticks or circles located inside the zodiacal belt. The figures surrounding this circle are not elements of the main horoscope. They belong to partial horoscopes. However, among the figures with planetary walking sticks inside the zodiacal belt, there are some which belong to the partial horoscopes. In the most cases there is no problem to recognize such figures, but there are two doubtful cases, where we can not decide immediately to what kind of horoscope it belongs. The first such symbols is a planetary figure of a traveler standing above Capricorn. The second one is a planetary figure standing above the Virgo's spike. Since both these symbols are placed closely above other objects, which could possibly indicate a *pull-out* situation, so there is a chance that they belong to partial horoscopes. If they were standing on an object like a boat or snake, there wouldn't be any doubt that they belong to a partial horoscope. But the situation with these two figures constitutes a case where the both possibilities should be considered. At the end, we found out that the figure standing over Capricorn belongs to the main horoscope, while the second figure, above the Virgo's spike, belongs to a partial horoscope. Since in the first stage of the dating we considered all the variants for these two figures, we marked them with two colors: yellow — the color of the main horoscope, and light-blue — the color of partial horoscopes.

Let us list all the planetary figures in the main horoscope on the Round zodiac.

(1) Saturn — a male figure with a planetary walking stick and a crescent on his head. It is located between Virgo and Libra. To find out why this figure was recognize as Saturn, see subsection 5.4.2. This identification of Saturn coincides with the identifications suggested by N.A. Morozov[26], N.S. Kellin and D.V. Denisenko[27], T.N. Fomenko[28], and Egyptologists[29].
Consequently, Saturn on the Round zodiac is either in Libra or in Virgo, so the range of admissible positions of Saturn is Libra and Virgo.
N.A. Morozov believed that Saturn on the Round zodiac was located in Virgo, and the same opinion was also expressed by N.S. Kellin and D.V. Denisenko, and T.N. Fomenko. Therefore, we choose as its best point the middle point of Virgo. Recall that the best points are only used in the elimination process to determine the order of the planets and the mean discrepancy from the best points gives only a rough idea about the precision of a solution and had no part in the elimination process (see section 6.12).

(2) Jupiter — a man holding a planetary walking stick walking in between Cancer and Gemini. In this identification we agree again with N.A. Morozov, N.S. Kellin and D.V. Denisenko, T.N. Fomenko, and Egyptologists. According to the translation of the hieroglyphic inscription over the head of this figure, which is given in [10], the figure is indeed Jupiter (see subsection 5.4.6). Consequently, Jupiter on the Round zodiac is either in Cancer or in Gemini, so the range of admissible positions of Jupiter is Cancer and Gemini.

Following the idea of N.A. Morozov, who believed that Jupiter was in Cancer, we choose as the best point for Jupiter the middle of Cancer.

(3) Mars — a male figure with a planetary walking stick standing over Capricorn. We recognized this symbol as a representation of Mars, because of the hieroglyphic inscription above its head, which indicates clearly the name of Mars (see subsection 5.4.5). As we already mentioned, there is some doubt related to this figure based on its placement above Capricorn — a possibility that this arrangement signalizes a *pull-out* situation. However, there is no other admissible variant for Mars in the main horoscope on the Round zodiac, so we do not have other choice but only to consider this figure as Mars in the main horoscope. It seems that due to the round shape of this zodiac its authors avoided to use of other pull-out symbols except the standard boats or snakes. Since all the figures on this zodiac are placed either under or above other figures, a confusion could result if some of them were used as other kind of pull-out symbols. Still there are some exception which we will discuss a little later. Again, there is no disagreement in this identification of Mars on the Round zodiac with other researchers, including N.A. Morozov, N.S. Kellin and D.V. Denisenko, T.N. Fomenko, and Egyptologists.

Consequently, Mars on the Round zodiac is shown in Capricorn, so the range of its admissible positions is Capricorn.

The best point for Mars is clearly the middle of Capricorn.

(4) Venus — a pair of female travelers with planetary walking sticks (see subsection 5.4.6). The leading female figure has a lioness head. They are located right under the symbol of Aries, but the strings from Pisces also point to these females in a way, which looks like they were holding them. Therefore, from these indications we can conclude that Venus was either in Aries or Pisces. This identification of Venus is the same as it was proposed by N.A. Morozov, N.S. Kellin and D.V. Denisenko, and T.N. Fomenko, but it is different than suggested by H. Brugsch and commonly used by Egyptologists. For more details we refer to subsections 5.4.6 and 5.4.7. In the case of Venus, the visibility attributes are very important. On the Round zodiac such an attribute is a sign of star placed over the head of a planetary figure. There is no such sign here, what indicates that Venus was invisible. Using a series of detailed photographs, we carefully checked and confirmed the absence of this attribute.

In conclusion, Venus on the Round zodiac is shown either in Aries or Pisces, so the range of its admissible positions is Aries and Pisces.

[26] See [4], Vol. 6.
[27] See [15].
[28] See [1].
[29] See [10].

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Following the suggestions of N.A. Morozov, N.S. Kellin and D.V. Denisenko, and T.N. Fomenko, who believed that Venus was shown in Aries, we choose as its best point the middle of Aries.

(5) Mercury — a two faced male figure with a planetary walking stick located in between Pisces and Aquarius. Over its head there is a star indicating its visibility. Our identification of Mercury coincides with the identifications done by N.A. Morozov, N.S. Kellin and D.V. Denisenko, and T.N. Fomenko, but is different from the one proposed by H. Brugsch and followed by Egyptologists (see subsections 5.4.6 and 5.4.7).

Thus, Mercury on the Round zodiac is either in Aquarius or in Pisces, so the range of its admissible positions is Aquarius and Pisces.

As the best point for Mercury we choose the boundary between Aquarius and Pisces.

On Figure 7.23, we show a photograph of a fragment of the Round zodiac with Mercury in the main horoscope.

Figure 7.23: *A fragment of the Round zodiac with Mercury.*

In this way, we were able to identify all the planets on the Round zodiac in the main horoscope, except the Sun and Moon. Recall that there were two figures with planetary walking sticks, regarding which there were some doubts about the type of the horoscope they belong to. One of these figures, located over Capricorn, turned out to be Mars in the main horoscope. As all the planets in the main horoscope, represented by travelers, are already identified, the only choice for the second figure, standing over Virgo's spike, is to belong to the partial horoscope of the autumn equinox. Notice that, except figures on the boats, there are no other figures with planetary walking sticks on the Round zodiac.

Now we begin our discussion of the Sun and Moon on the Round zodiac. Recall that the Sun and Moon in main horoscopes on the Egyptian zodiacs, were always represented by discs, discs with attached crescents, or crescents for the Moon only.

(6) Sun and Moon — in this case we can make a definite identification at the preliminary stage. The situation here is similar to the Long zodiac. On the Round zodiac there are three discs, which could be considered as candidates for the Sun and Moon in the main horoscope. Two of them are located in Pisces and the third one in Libra. We considered all the six possible variants of the Sun and Moon identifications, assuming that the remaining third disc belongs to a partial horoscope. The variant that led to a complete solution turned out to be in full agreement with the symbols of the Sun and Moon which were already determined for the Long zodiac. Namely, on the both Denderah zodiacs the discs in Libra, with exactly the same figure inside, symbolize Moon. In the both cases it was Full Moon. On the Round zodiac, the disc in Pisces, with a figure inside making an offering, was determined to be the Sun in the partial horoscope of the spring equinox. A similar symbol in Pisces on the Long zodiac represented the Sun in the partial horoscope of the spring equinox. The only difference between these two discs is that the figure inside on the Round zodiac is female, while on the Long zodiac it is a male. Recall that on the Long zodiac, that figure represented Jupiter "making offering to the Sun" at the spring equinox. Here, on the Round zodiac, this female figure is Venus (see below). Finally, the Sun in the main horoscope turned out to be the disc between Aries and Pisces, with a symbol of an eye inside (see more information related to the eye-symbol in subsection 5.4.12). In our case, the symbol of the eye probably indicates a proximity of the Sun to the star αAri, which in the old astronomy had the name *Eye of Aries* (see subsection 5.4.12).

Step 2. (See subsection 6.7.2.) In this step, for each of the variants, related to the identifications of the Sun and Moon, we conducted computations with the use of the program *Horos*. We required that any admissible solution must have the same order of planets as it is shown on the Round zodiac. All the solutions that didn't meet this requirement were rejected. In result, several dozens of preliminary dates were obtained in the specified time interval (from 500 B.C. till 1980 A.D. — see section 6.7). Next, for all the obtained astronomical solutions we checked the visibility conditions and the partial horoscopes.

7.4.3 Partial Horoscopes on the Round Zodiac.

[A] **Partial Horoscope of the Autumn Equinox**: The partial horoscope of the autumn equinox is located around the figure of Virgo (see Figures 7.20 and 7.21). It contains:

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– the figure of a traveler standing on the spike of Virgo (see Figure 7.20, 7.21 and 2.32 and 2.34).
– the bird sitting on the tail of the snake under the Leo's figure. Since it is right under the additional Virgo (see subsections 5.1.5 and 5.1.6) standing on the Leo's tail, it could refer either to Leo or Virgo.
– the five figures located under the constellations of Libra, Virgo and Leo in the procession of figures belonging to the partial horoscopes (see Figure 7.20 and 7.21). The first figure is a person sitting on a chair with spread out arms holding two identical objects. It is located under Leo. It symbolizes the equilibrium between the day and night occurring at the equinox (see section 5.8). The figures in the procession preceding it belong to the partial horoscope of the summer solstice, which we will discuss later. The second figure — a person sitting on a chair and holding a child on his/her hand. This is probably a symbol of the new year (see section 5.8). As we already explained earlier, the Egyptian new year began in September near the autumn equinox. The next symbol is a figure of Saturn with a crescent on the head holding a scythe (see subsection 5.4.2 and Figure 5.29 and Figures 7.20 and 7.21). Notice that the figure of Saturn in the main horoscope is just above it. This situation is natural because Saturn moves so slow that within one year its position does not change much. Therefore, it has almost the same position in the partial horoscope as in the main horoscope. Notice that these two figures of Saturn are almost the same, except Saturn in the main horoscope has a planetary walking stick instead scythe. The forth figure is a lion with front paws on the equinox symbol, a rectangular table with wavy lines (see section 5.8). Finally, behind the lion there is a half human half animal figure. It appears as a female with a lioness lower body with one hand holding a bowl. Bowl in her hand is an indication of a planet in a partial horoscope. We have already seen a similar figure holding bowls in the partial horoscope of the winter solstice on the Long zodiac. Later in this chapter we will see more examples of such bowls on the Esna zodiacs. We can conclude that this figure is a planetary symbol of a partial horoscope. Since it's a female with lioness attributes, it must be Venus in Leo (because it is preceded by a figure of lion). Consequently, the meaning of this composition is understandable. In fact these five figures provide us with the information that on the autumn equinox Saturn was approximately at the same place as in the main horoscope (in Virgo or in Libra), and Venus was in Leo.

Let us analyze the meaning of the first two figures mentioned earlier, i.e. the male planet standing on the Virgo's spike and the bird sitting on the Leo's snake. Let us point out that the spike in Virgo's hand is not just a decoration, but it represents the brightest star in this constellation. In the modern astronomy it is denoted as $\alpha\,Virgo$, but in the old astronomy it was called *Spica* or *Spike or Virgo*[30]. On the old astronomical charts this star was placed exactly at the top of the spike in the Virgo's hand. The fact that this planetary symbol stands right at the top of the spike, indicates that it was very close to αVirgo on this day. We still need to explain what planet it is. To solve this problem we notice a hieroglyphic inscription above its head as well as a star indicating its visibility. On Figure 7.24 we present a brief table of several basic Egyptian hieroglyphs, which is completely sufficient for our purposes.

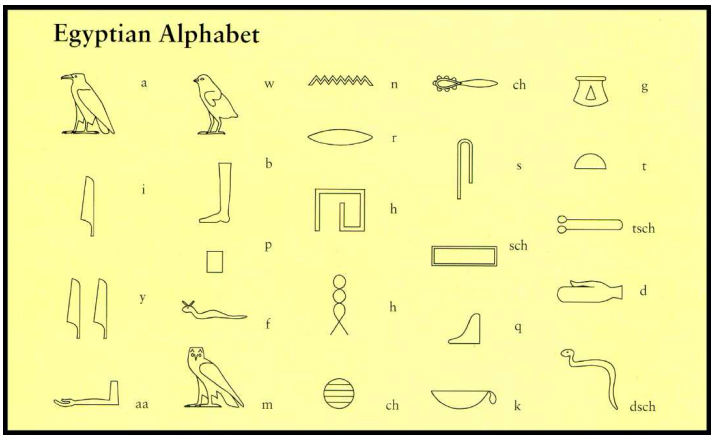

Figure 7.24: *Egyptian Alphabet.* (Taken from [116], p. 70)

In this inscription there are three hieroglyphs (see Figures 2.34 and 7.25). The hieroglyphs were written in such a way that they always face the beginning of the word[31], so the first symbol in this inscription is the curved line (or rope), which stands for the letter *S*. The second symbol is the leg, which means the letter *B*, and the third one, which looks like a cup with a handle, stands for the letter *K*. (See Figure 7.24.) In the Egyptian hieroglyphic writing usually only consonants were used, and all the vowels were omitted, so Egyptologists adopted a convention to put *E* between the consonants if there is no vowel[32]. Therefore, the name of this planet is *SEBEK*, which according to Henry Brugsch means *Mercury*[33].

On the other hand the figure itself has an appearance that is appropriate for Mercury (see Figure 2.34). Indeed, on some Egyptian zodiacs it was represented by a male figure with human face (see subsection 5.4.9). Let us mention that in the works of contemporary Egyptologist S. Cauville, this figure was also identified as Mercury[34]. We would like to signal that in the Napoleonic

[30] See [22].
[31] See [116], p.71.
[32] See [116], p. 71.
[33] See [4], Vol. 6, p. 697.
[34] See cite[10], p. 29.

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Figure 7.25: *The hieroglyphic inscription above the head of a planetary figure standing on Virgo's spike.*

Album this figure is presented incorrectly. First of all, it is shifted away from Virgo's spike (see Figure 2.33), and the hieroglyphic inscription above its head is distorted. Instead of the two hieroglyphs placed at the top, there was created a bended snake (see Figures 2.33 and 2.34 in Chapter 2).

In conclusion, we obtain that in the partial horoscope of the autumn equinox we have:
- Saturn — approximately located in the same place as in the main horoscope, i.e. in Virgo or in Libra,
- Mercury — on Virgo's spike, which means that it was very close to the star αVirgo — also called Spica,
- Venus — in Leo.
- One more planet, possibly the Sun, is shown as a bird in Virgo or in Leo (under the feet of the "additional" Virgo).

Let us remark that in this location on the Round zodiac there is another small planetary figure belonging a partial horoscope. It is a human figure sitting on a chair over Leo, and holding a whip. As it has the same orientation as Gemini and other figures in the partial horoscope of the summer solstice, it could possibly belong to that partial horoscope. In our verification process we considered the both variants, but in the final solution it turned out that it belongs to the summer solstice partial horoscope and we will discuss it later in this section.

[B] **Partial Horoscope of the Winter Solstice**: This partial horoscope was already discussed, as one of our examples in subsection 5.5.2, so we will present here only the final conclusions that we made there.

In the partial horoscope of the winter solstice, on the Round Denderah zodiac, beside the minimal partial horoscope, which was incorporated into the figure of Sagittarius, there are three planets shown separately. One of them is probably the Sun, but two or even three other planets were also there. We definitely can recognize Mars and the other one was most probably Venus.

[C] **Partial Horoscope of the Spring Equinox**: This partial horoscope depends on the variant of decoding of the main horoscope. Among two discs in Pisces, the one that doesn't belong to the main horoscope (if it is the case) should be included in the partial horoscope of the spring equinox. We will describe the elements of this partial horoscope that were obtained from the decoding that led to the final solution. In this case, the disc with an eye inside represents the Sun in the main horoscope and the another one is not used in the main horoscope, thus, it belongs to the partial horoscope. Clearly, as it is the only element of this partial horoscope, it represents the Sun. Notice that this disc is relatively larger in size than other discs on the Round zodiac, what in some sense can be explain by the fact that the spring equinox was considered as a Festival of the Sun. Notice that this decoding is also supported by the fact that the partial horoscope of the spring equinox, which resulted from it, appears to be very similar to the spring equinox horoscope on the Long zodiac. The only difference is that the figure making an offering inside the disc on the Long zodiac was a male, and here, on the Round zodiac, it is a female. The meaning of this scene is that "Venus was making an offering to the Sun on the spring equinox day." In other words, Venus was the most impressive planet around the Sun, so it was not far from the Sun and visible.

[D] **Partial Horoscope of the Summer Solstice**: This partial horoscope consists of several figures, some of them located inside the zodiacal belt, and others being a part of the semi-circular procession of the partial horoscope figures, which surrounds from the bottom and left the zodiacal belt (see Figures 7.20 and 7.21).

Let us list all these figures. Inside the zodiacal belt there are two such figures. The first one is a male figure holding two short sticks in his hand — one of them is T-shaped. This figure is located in between Gemini and Taurus. It has two feathers on its head. A figure with similar two feathers on its head represented "second" Mercury on the Long zodiac (see Figures 7.11 and 7.12). This type of head decoration is not very common on the Egyptian zodiacs, so it seems that these two figures should be related to the same planet. The second figure, which we already mentioned above, is a human figure sitting on a chair with a whip in a hand. It is located right above Leo. It has a high hat. The gender of this figure is difficult to identify. At this point we recognize two planets in this partial horoscope — the first one a male planet in Gemini or Taurus, probably Mercury (but other possibilities should not be excluded at this stage), and the second one — a male or female planet in Leo.

Now we will list the five figures in the procession outside of the zodiacal belt. They are located in the demi-circle of

the partial horoscope processions (see Figure 7.22). Right under Gemini, is the center of the summer solstice procession — a column with a bird-sun sitting on it. This figure is already familiar to us (see section 5.8) and we can recognize it as a symbol of the summer solstice. It shows the Sun at its highest point on the sky, which is reached on the summer solstice day only. On the left from this figure, there is a laying bull on a boat, which is also a typical symbol associated with the summer solstice (see section 5.8). On the both sides this pair we see two figures representing planets in the partial horoscope. On the right, there is a male figure with a planetary walking stick. There is also a bird walking behind that figure. The man carries a whip on his shoulder. We recognize this symbol as a male planet located on the Taurus side from the Sun in Gemini, which could only be visible before the dawn on the solstice day. The exact location of this planet is not clear. We already observed that some planets in the demicircle of the partial horoscopes are not always related to the closest constellation in the zodiacal belt. In fact, the hole procession is assumed to be located around of the central constellation of this partial horoscope, which contains the corresponding solstice or equinox point. There are no connections between the figures in the procession and other constellations in the zodiacal belt. For example, in the autumn equinox procession there is a figure of lion. It symbolizes Leo in this procession, but it is placed under Libra, far away from the figure of Leo. From this picture we can only guess that a male planet appeared on the Taurus side from the Sun, but we can not be certain about it.

On the other side from the summer solstice symbols, there is a woman shooting an arrow over the bull. This symbol appears on many Egyptian zodiacs (see section 5.8). It is most likely that it represents Venus on the summer solstice day. The meaning of this scene is unclear to us. Since this figure is located on the opposite side from the Sun, it indicates that Venus was observed on the evening twilight sky.

In summary, we obtain the following information from this partial horoscope; In Gemini or in Taurus there was a male planet, probably Mercury. Another planet was in Leo, but we do not have any specific information about it. There was one more male planet. Probably it was on the Taurus side of the Sun (which was in Gemini), and its remarkable size suggests that it was well visible. This planet and Venus were on the opposite sides of the Sun.

7.4.4 Final Solution for the Round Zodiac: Morning of March 20, 1185 A.D.

Step 3. In this step we validated all the preliminary dates for the Long zodiac obtained in Step 2. It was done manually using the program *Turbo Sky* written by A.V. Volynkin. In result, a full solution was found for only one variant of decoding for the Round zodiac, and it turned our to be unique. Let us present this final decoding that led to the full astronomical solution for the Round zodiac:

```
--------------- INPUT DATA FOR HOROS ---------------
ZODIAC: The Round Denderah (DL)
DECODING VARIANT: Moon in Libra
CODE OF THE DECODING VARIANT: DR9

LOCATIONS OF THE PLANETS IN THE MAIN HOROSCOPE:

SUN -- in Pisces; Range: from the middle of Aquarius to
the middle of Aries; Best Point: the middle of Pisces.

MOON -- the disc in Libra; Range: from the middle of
Virgo to the middle of Scorpio; Best Point: the middle
of Libra.

SATURN -- in Virgo or Libra; Range: Virgo and Libra;
Best Point: the middle of Libra.

JUPITER -- in Cancer or in Gemini; Range: Cancer and
Gemini; Best Point: the middle of Cancer.

MARS -- in Capricorn; Range: Capricorn; Best Point: the
middle of Capricorn.

VENUS -- in Pisces or in Aries; Range: Pisces and Aries;
Best Point: the middle of Aries.

MERCURY -- in Aquarius or in Pisces; Range: Aquarius
and Pisces; Best Point: the boundary between Aries and
Pisces.

We admit 5° tolerance for all the boundaries of the
planetary ranges.

ORDER OF PLANETS ON THE ECLIPTIC (in the direction of
the increasing longitude):
VENUS, JUPITER, SATURN, MOON, MARS, MERCURY, SUN


----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
      10.5   5.5    5.0    2.0    9.0  11.0   10.0 # TO:
-----------------------------------------#
       0.5   7.5    7.0    4.0   10.0   1.0   12.0
# BEST POINTS: ------------------------------------#
      11.5   6.5    5.5    3.5    9.5   0.5   11.0
--------------------END OF DATA---------------------


REMARK: The following constellation scale was used (see
section 6.10):
<0>ARIES<1>TAUR<2>GEMINI<3>CANCER<4>LEO<5>VIR<6>
LIB<7>SCORP<8>SAGITT<9>CAPRIC<10>AQUA<11>PISC<12=0>

-------------------------------------------------
```

The unique solution that was obtained for this decoding was the morning on March 20, 1185 A.D. The mean distance from the best points for his solution was only 9^o, which is less than one third of the average length of a zodiacal constellation. It is a very good result with the planetary positions very close to the best points.

We would like to point out that the Full Moon occurred on the night between March 19 and 20, 1185 A.D. Let us present the exact positions of the planets on the ecliptic for these dates March 19, 20, and 21, 1185 A.D. (see Table 7.6):

Julian day (JD) = 2153957.00 Year/Month/Day = 1185/3/19						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
377.0^o 11.76	214.3^o 5.97	178.0^o 5.08	142.1^o 3.94	318.4^o 9.60	29.2^o 0.11	352.9^o 11.16
Pisces	Vir/Lib	Vir/Leo	Can/Leo	Capric	Aries	Pisces
Mean Distance from the Best Points= 9.9^o						
Julian day (JD) = 2153958.00(Full Moon in Libra) Year/Month/Day= 1185/3/20						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
377.9^o 11.78	226.3^o 6.51	177.9^o 5.08	142.1^o 3.94	319.2^o 9.63	30.5^o 0.16	354.4^o 11.20
Pisces	Libra	Vir/Leo	Can/Leo	Capric	Aries	Pisces
Mean Distance from the Best Points= 8.5^o						
Julian day (JD) = 2153959.00 Year/Month/Day = 1185/3/21						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
378.9^o 11.81	238.1^o 7.05	177.9^o 5.08	142.0^o 3.94	319.9^o 9.66	31.7^o 0.21	355.9^o 11.23
Pisces	Sco/Lib	Vir/Leo	Can/Leo	Capric	Aries	Pisces
Mean Distance from the Best Points= 10.5^o						

Table 7.6: *Complete Solution for the Round Denderah Zodiac (Main Horoscope)*

7.4.5 Checkup List for the Round Zodiac Final Solution

Let us present the verification process applied to the final solution of the morning on March 20, 1185 A.D., obtained for the Round Denderah zodiac. On Figure 7.26 we show the check-up list for this solution presented in a form of a table. The symbol of an encircled sign *plus* was used to indicate that the correspondence between the particular information on the zodiac and the solution was confirmed (see section 6.14).

We will explain the contents of this check-up list.

Column 1: VISIBILITY OF MERCURY. In the morning on March 20, 1185, Mercury was clearly visible in Cairo, and even longer in Luxor. The submersion of the Sun in Cairo at the moment when Mercury was rising was SUH=12^o and the brightness of Mercury was $M = +0.7$, which means it was equally bright as the strongest stars. These facts agree very well with the representation of Mercury in the main horoscope on the Round zodiac, where there is a star over its head. Consequently, this date is confirmed and we can annotate this column with a mark of plus.

Column 2: VISIBILITY OF VENUS. On the Round zodiac there is no star sign over the couple of female figures representing Venus in the main horoscope. That means, Venus was not visible on the date of the main horoscope at the time of observation.

Indeed, in the morning on March 20, 1185, Venus wasn't visible because it was under the horizon. It appeared only in the evening. In this case we can confirm this data by assuming that this was a *morning horoscope* and we can annotate this column with the plus sign. Let us remark, that the Round zodiac is an example of a zodiac, which seems to be based purely on observations, rather than calculations.

Julian day (JD) = 2153767.00 Year/Month/Day = 1184/9/10						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
185.8^o 5.27	227.4^o 6.56	174.7^o 5.00	143.3^o 3.99	184.7^o 5.25	152.4^o 4.29	204.4^o 5.73

Table 7.7: *Planetary Positions on September 10, 1184*

Column 3: PARTIAL HOROSCOPE OF THE AUTUMN EQUINOX. As before, we consider here the variant of the beginning of the Egyptian year in September. The year related to the solution started in September 1184 and ended by September 1185. The autumn equinox day occurred in this year on September 12, 1184 (see Appendix **??**).

As we already explained, in old times the determination of the exact equinox day wasn't very precise and even in the 14th century mistakes up to six days were made. Therefore, we will analyze the planetary positions during the time interval from September 6 till September 18, 1184. Indeed, on September 10, 1184, i.e. two days before the exact autumn equinox day, the planets close to the Sun were arranged in a configuration which exactly correspond to the picture of the autumn equinox on the Round zodiac. Below, we present the calculated longitudes of the planets on September 10, 1184 (see Table 7.7).

On Figure 7.27, we show a chart of the morning and evening sky that was visible in Cairo on September 10, 1184. The invisible part of the sky between the morning and evening horizons is colored in gray-blue.

Let us list the planets that were visible on that day. In the morning: Saturn (with M=+0.9) – the closest to the Sun visible planet, Venus (with $M = -3.6$) — next to Regulus (αLeo) on the boundary between Virgo and Leo, and Jupiter (with $M = -1.4$) — in Leo. In the evening: only Mercury

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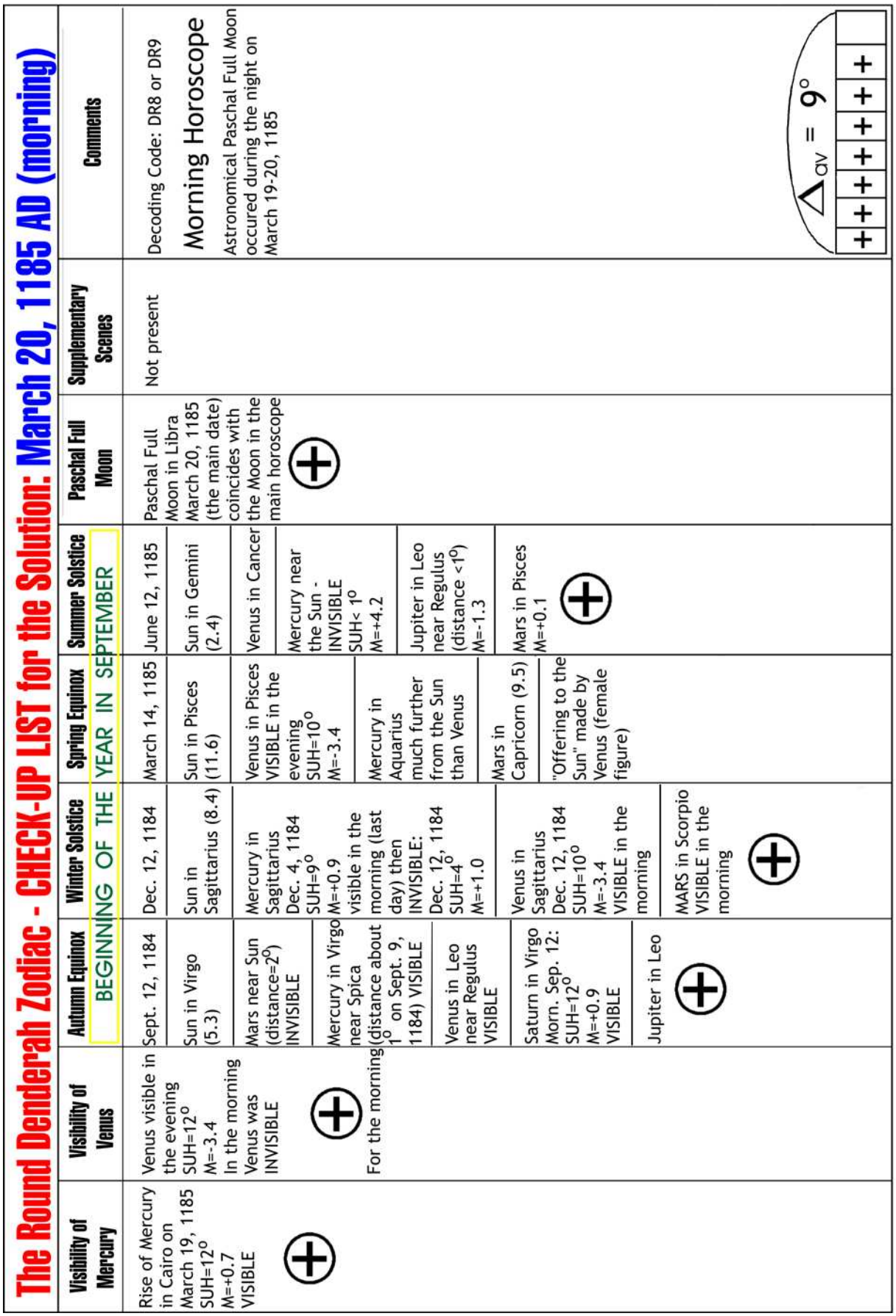

Figure 7.26: *Check-Up List for the final solution for the Round Denderah Zodiac: March 20, 1185 A.D. (morning)*

(with $M = +0.98$) was visible at the evening twilight. The submersion of the Sun at the moment when Mercury was setting down was only SUH=9^o, but still Mercury was sufficiently bright to be visible in such circumstances. At that time Mercury was very close to the star Spica (αVirgo) — distance between them was around 1^o. Mars was near the Sun in a distance of about 2^o and it was completely invisible throughout all the autumn equinox days.

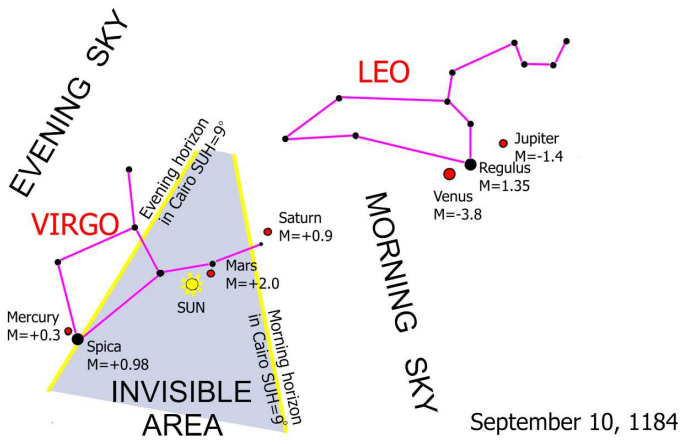

Figure 7.27: *Planets in the proximity of the Sun on September 10, 1185. The invisible area around the Sun is shaded.*

We are now ready to compare this information with the situation on the Round zodiac. Let us recall the contents of the autumn equinox partial horoscope: Mercury on the Virgo's spike (i.e. very close to Spica), Saturn on its place in the main horoscope (i.e. in Virgo or Libra), Venus in Leo, and one more planet, possibly the Sun, is shown as a bird in Virgo or in Leo (under the feet of the "additional" Virgo).By comparing it with the situation on Figure 7.27, we notice that Mercury is exactly located as it is suggested on the zodiac. Saturn is also on its place, as it is expected from the main horoscope. Position of Venus is exactly as it should be. Invisible Mars, which was in Virgo, corresponds well to the figure of a bird "hiding" under the figure of "additional Virgo." Indeed, a figure in a hiding position is a natural symbol for an invisible planet. At this point, only Jupiter is missing from this partial horoscope. However, let us notice the small sitting figure above Leo. As we mentioned before, it could be related to the partial horoscope of the autumn equinox as well as to the summer solstice partial horoscope. The solution that we've obtained suggests that symbol is Jupiter in these both partial horoscopes. Usually, it doesn't stay so long in one constellation, but during this particular year it was making a loop in Leo, so it was "sitting" there almost the whole year.

Consequently, we have a perfect confirmation of all the data related to the autumn equinox partial horoscope. So, we annotate this column with the plus sign.

Column 4: PARTIAL HOROSCOPE OF THE WINTER SOLSTICE. In the Egyptian year related to this solution, the winter solstice took place on December 12, 1184 (see Appendix **??**). By admitting a few days error margin we consider the winter solstice days to be approximately from December 6 to December 18, 1184. In these days, Mercury which was close to the Sun, disappeared from the Sky on December 4. Therefore, we will present the planetary position on two days: December 4 (when Mercury was still visible) and December 12, 1184 (when Mercury was not visible anymore). The other planets, except Moon, did not changed significantly their positions during the winter solstice days. Notice, that Moon on December 4-5 was invisible. At that time it was located in Sagittarius. The New Moon reappeared in the evening on December 6, in between Sagittarius and Capricorn.

Julian day (JD) = 2153852.00 Year/Month/Day = 1184/12/4						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
271.2^o 8.13	265.6^o 7.97	182.4^o 5.19	151.9^o 4.27	242.1^o 7.19	257.9^o 7.71	261.2^o 7.82
Julian day (JD) = 2153860.00 Year/Month/Day= 1184/12/12						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
279.4^o 8.37	369.0^o 11.56	182.6^o 5.20	151.7^o 4.26	247.7^o 7.37	268.0^o 8.04	273.7^o 8.20

Table 7.8: *Planetary Positions in the Period December 4–12, 1167*

On Figure 7.28 we show the position of planets around the Sun on December 4, 1184, when Mercury was still visible. On this day, before the dawn, there were visible three planets. Mercury in Sagittarius, on the edge of the horizon, Venus in between Sagittarius and Scorpio, and Mars in Scorpio. At the evening twilight there were no visible planets. At that time Jupiter was in Leo, and Saturn in Virgo, i.e. the both planets were far from the Sun.

Let us recall the partial horoscope of the winter solstice on the Round zodiac (see subsection 7.4.3.[B]). There are three planets shown: the figure sitting on a chair in a boat with a disc over its head, which could be the Sun or other planet, the male figure standing over the goose, which is an attribute of Mars, and a small figure sitting on a chair above Libra, which could represent Venus. Notice that the essential information here is the presence of Mars, which we can recognize with high confidence by its attribute — a goose. Let us compare this information with the astronomical solution. On Figure 7.28 we see three planets near the Sun: Mars, Mercury and Venus. Mars was in Scorpio, so in this solution it should be represented on the Round zodiac by the figure sitting on a chair in a boat with the disc over its head. Indeed, this figure

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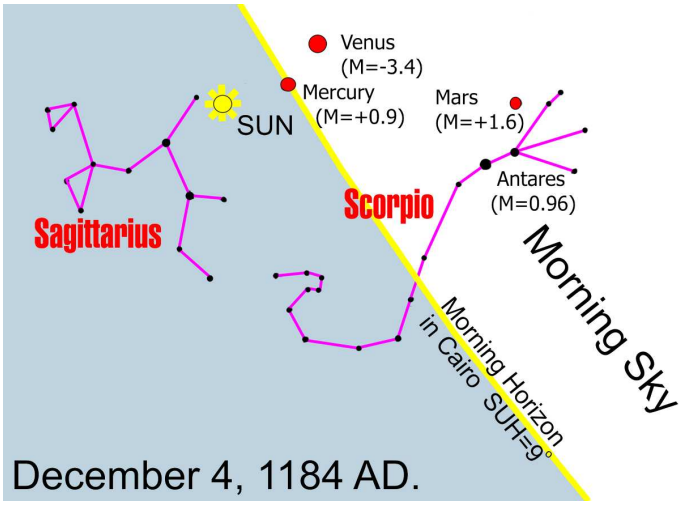

Figure 7.28: *Planets in the proximity of the Sun on December 4, 1184. The area under the horizon is shaded.*

is in Scorpio and it has the same falcon head as the figure of Mars in the main horoscope. The disc over its head can refer to the Sun. In the solution, beside Mars there are two more visible planets — Venus and Mercury. In the partial horoscope there are also two more figures — one is a male with human face, which fits Mercury very well, and another figure with unclear gender accompanied by an animal (probably a lioness), which could be Venus. In this context, we have the correspondence between the data in the partial horoscope and the solution. Consequently, we put the sign plus to annotate this column.

Column 5: PARTIAL HOROSCOPE OF THE SPRING EQUINOX. In 1185, the spring equinox occurred on March 13-14 (see Appendix **??**), which was very close date to the date of the main horoscope. Let us present the positions of the planets near the Sun on March 14, 1168 (see Table 7.9).

Julian day (JD) = 2153952.00 **Year/Month/Day = 1184/3/14**						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
372.0^o 11.64	151.7^o 4.26	178.4^o 5.09	142.3^o 3.95	314.7^o 9.47	383.1^o 11.91	345.9^o 10.96

Table 7.9: *Planetary Positions on March 14, 1184*

Since the spring equinox occurred just a few days before the main date, all the planets (except Moon) were almost at the same positions as in the main horoscope. On the Round zodiac, as it is on the Long zodiac, the partial horoscope of the spring equinox consists only of the disc representing the Sun and the figure inside it representing the planet that was in its proximity on the equinox day. In the above table, we can easily recognize that the closest planet to the Sun on the equinox day was Venus. The computations made using the program *Turbo-Sky* confirm that Venus was clearly visible on March 14, 1168. The submersion of the Sun at the moment Venus was crossing the horizon in Cairo was SUH=10^o, while brightness of Venus was $M = -3.4$. There were no other planets near Venus, so the figure making an "offering to the Sun" inside the disc must be Venus, which matches well the female figure inside the disc. Consequently, we obtained the confirmation for all the data and we can annotate this column with the plus sign.

Column 6: PARTIAL HOROSCOPE OF THE SUMMER SOLSTICE. In the year 1185, the summer solstice occurred on June 12-13. Let us list the positions of the planets on the ecliptic on one of the summer solstice days, i.e. June 12, 1185 (see Table 7.10).

Julian day (JD) = 2154043.00 **Year/Month/Day = 1185/6/13**						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
99.8^o 2.35	264.3^o 7.92	176.9^o 5.06	149.3^o 4.19	381.2^o 11.87	133.7^o 3.60	98.5^o 2.31

Table 7.10: *Planetary Positions on June 13, 1185*

On Figure 7.29, we show the configuration of the planets around the Sun on the summer solstice day on June 12, 1185. We can describe the situation on this day as follows

(1) In Gemini, near the Sun was only Mercury. The Sun submersion for Mercury on the horizon was about 1^o only, so it was invisible (its brightness was $M = +4.3$).
(2) Jupiter was visible in the evening in Leo, right beside of Regulus. It was very bright ($M = -1.3$).
(3) Venus was visible in the evening in Cancer. Its brightness was $M = -3.8$.
(4) In the morning only Mars was visible. It was located rather far from the Sun in Pisces, but it was the nearest to the Sun visible planet in before the dawn. Its brightness was very strong ($M = +0.1$) and approximately the same as the brightness of Arcturus. Consequently, on this day Mars was brighter than any star, except Sirius. Since two hours before the dawn, Sirius and Arcturus were already under the horizon, Mars appeared on that morning as the brightest "star" on the sky.

Let us recall the partial horoscope of the summer solstice and compare it with the solution.

(1) In Gemini or in Taurus, was a male planet, probably Mercury. This agrees exactly with the solution.
(2) Another planet was in Leo, which we recognized as Jupiter (notice that the same symbol represents Jupiter in the

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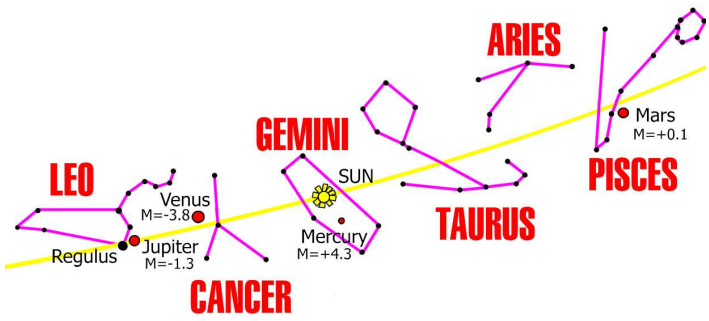

Figure 7.29: *Planets around the Sun on the summer solstice day on June 12, 1185.*

partial horoscope of the autumn equinox). Again, we have the exact correspondence.

(3) Venus was shown on the evening side of the Sun. In the solution Venus was in Cancer, which is the evening side of the Sun.

(4) On the morning side there is shown a male planet, probably Mars (indicated by its attributes: a whip and a goose-like bird). This figure is very large — the largest planetary figure on the Round zodiac. This corresponds well to the solution, according to which before the dawn, on the summer solstice day, only one planet was visible — it was male planet and the brightest "star" on the sky. This planet was Mars. Now we can explain why its figure on the Round zodiac is so big. It is extremely rare for Mars to be the brightest "star" on the sky.

In this way we concluded the verification of the data for the partial horoscope of the summer solstice and we can confirm that the solution agrees well with it. Consequently, we put the sign plus in the sixth column.

Column 7: SUPPLEMENTARY SCENE OF THE PASCHAL FULL MOON. We need to discuss the Paschal Full Moon that occurred in the year 1185 on March 20, which is exactly the main date of the Round zodiac. Because of this coincidence, we do not expect the Paschal Full Moon to be shown in a separate scene, and indeed, unlike to the Long zodiac, there is no such symbol here. Let us recall that in the case of the Long zodiac, the main date coincided with the Full Moon following the Paschal Full Moon, both of which occurred in Libra. That's why there were two separate symbols for Moon in Libra, while on the Round zodiac there is only one Moon indicated in Libra. Since the main date of the Round zodiac is exactly the Paschal Full Moon, we can consider this zodiac as *paschal zodiac*. In summary, this column can also be annotated with the plus sign to indicate the confirmation of this data.

Column 8: OTHER SUPPLEMENTARY SCENES. There are no supplementary scenes on the Round zodiac containing non-trivial information. All such scenes were discussed in section 5.9.

CONCLUSION: The Round Denderah zodiac represents the date March 20, 1185 A.D.

7.5 Decoding the Date from the Big Esna Zodiac

Let us now consider two zodiacs from the ancient Egyptian city Esna. As we already mentioned in section 2.1, during the Napoleonic expedition to Egypt, "very ancient" Egyptian structures were discovered in Esna. Judging from the pictures published in the Napoleonic Album[35], these buildings were in very bad shape — partially destroyed or seriously damaged. There were two zodiacs were discovered there — one in a very big temple (we call it the Big Esna zodiac and use the symbol "EB" for it), and another (which we call the Small Esna zodiac and use the symbol "EM") in a significantly smaller temple.

There are many similarities between the zodiacs from Denderah and Esna — they are stone reliefs of significant sizes, and their astronomical symbolism is exactly the same. Moreover, Esna and Denderah are located not far from each other, on the opposite sides of the Valley of the Kings near the big semicircle meander of the Nile river. The following interesting question arises: *What are exactly the dates encoded in the Esna zodiacs and how they are related to the dates of the zodiacs from the Denderah temple?*

When in 2001 we were conducting our first dating of the Big Esna zodiac, we did not have the actual photographs of the zodiac, and we had to trust its copy, which was made by the artists of the Napoleonic expedition. In June 2002, one of our authors — Gleb V. Nosovsky, was invited to participate in an expedition to Esna, which was organized by the Russian television production crew of the series "Unknown Planet." During this trip, Nosovsky had a rare opportunity to take multiple photographs of all the details of the Big Esna zodiac, in its present state. It turned out that the zodiac is very well preserved and there is no damage of missing parts. Some photographs were also taken by the official photograph of the expedition — Y.L. Maslev.

The photographs, which covered all the surface of the zodiac, showed that the accuracy of the Napoleonic drawing was very goo, however, there were some discrepancies with the original. The differences between the original Big Esna zodiac and Napoleonic drawing, were already discussed in section 2.4 (see Figures 2.37 — 2.45). Most of the imprecisions of the Napoleonic drawing were located on the zodiac in the places obstructed by the columns inside the temple. Checking these details required taking many different viewing positions, which possibly could be the reason for those errors. Let us point out that our previously obtained final result for the Big Esna zodiac: March 31 – April 3, 1394 A.D., fits even better the data that was retrieved from the actual photos of the

[35] See [2]

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Big Esna zodiac. In fact, some previously present ambiguities could be now easily clarified.

In this section we conduct the dating process using the corrected drawing of the Big Esna zodiac, which is the modified Napoleonic drawing with the modifications that were made based on the actual photographs of the zodiac (see Figures 7.31 and 7.32). We begin our analysis with the Big Esna zodiac.

7.5.1 Constellations and "Constellation Brackets" on the Big Esna Zodiac

For the purpose of dating, we need a more detailed pictures of the Big Esna zodiac, than the one shown on Figure 2.17. On Figures 7.31 and 7.32, we present the enlarged fragments of the Big Esna zodiac. These pictures are the corrected Napoleonic drawings of the Big Esna zodiac.

As we have already noticed, sometimes the drawings of zodiacs may not be very accurate. Nevertheless, in spite of small differences that we found on the Round Denderah zodiac and the Big Esna zodiac, the general accuracy of the drawings published in the Napoleonic Album is sufficiently high for the purpose of the astronomical dating. In the case of the Big Esna zodiac these differences were negligible and did not affect the final solution.

We will describe the dating of the Big Esna zodiac according to the steps explained in section 6.7.

7.5.2 Planetary Figures in the Main Horoscope on the Big Esna Zodiac

Step 1. (See subsection 6.7.1.) **Preliminary decoding of the main horoscope on the Big zodiac and compiling the color annotated zodiac.**

By using the comparative tables (see sections 5.1) of Egyptian astronomical symbols, we can identify all the symbols of constellations on the Big zodiac. They are represented by the same figures as on the Denderah zodiacs. However, the symbols of Gemini, Libra and Virgo, which are slightly different on the Big zodiac, require some additional explanations.

Gemini on the Big Esna zodiac is not represented, as it was on the both Denderah zodiacs, by two figures, but by **three** figures (see the color annotated Big Esna zodiac on Figure 7.33). The first figure is a man holding with his hands a long stick touching a small animal under his feet. He is followed by a male and female figures holding their hands crossed on their chests. Such a particular representation of Gemini is also present on the Small Esna zodiac. However, on the other Egyptian zodiacs, Gemini is shown in a different way. We will discuss it later.

Libra is represented on the Big zodiac by a symbol of a balance with two pans hung from bearings. This is also a symbol of Libra on the both Denderah zodiacs (see Figure

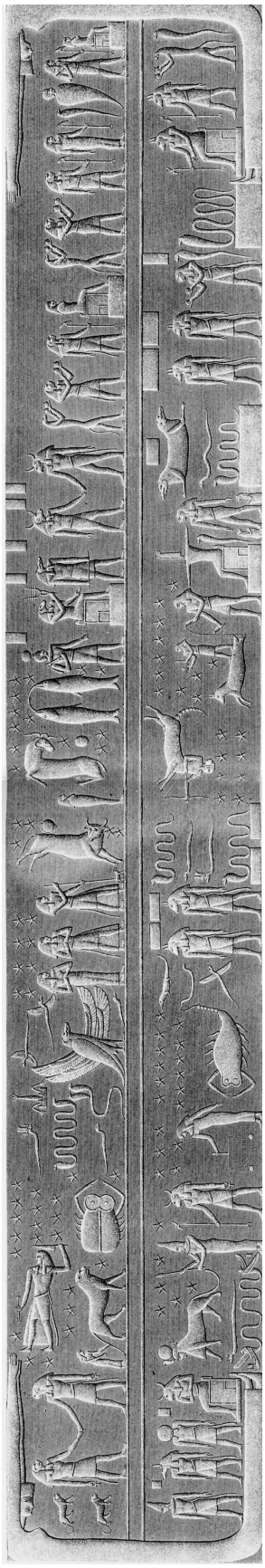

Figure 7.30: *A halftone picture of the Big Esna zodiac "EB," which was published in the Napoleonic Album. There are some differences between this picture and the original Big Esna zodiac.* (Taken from [2], A. Vol. I, Pl. 79)

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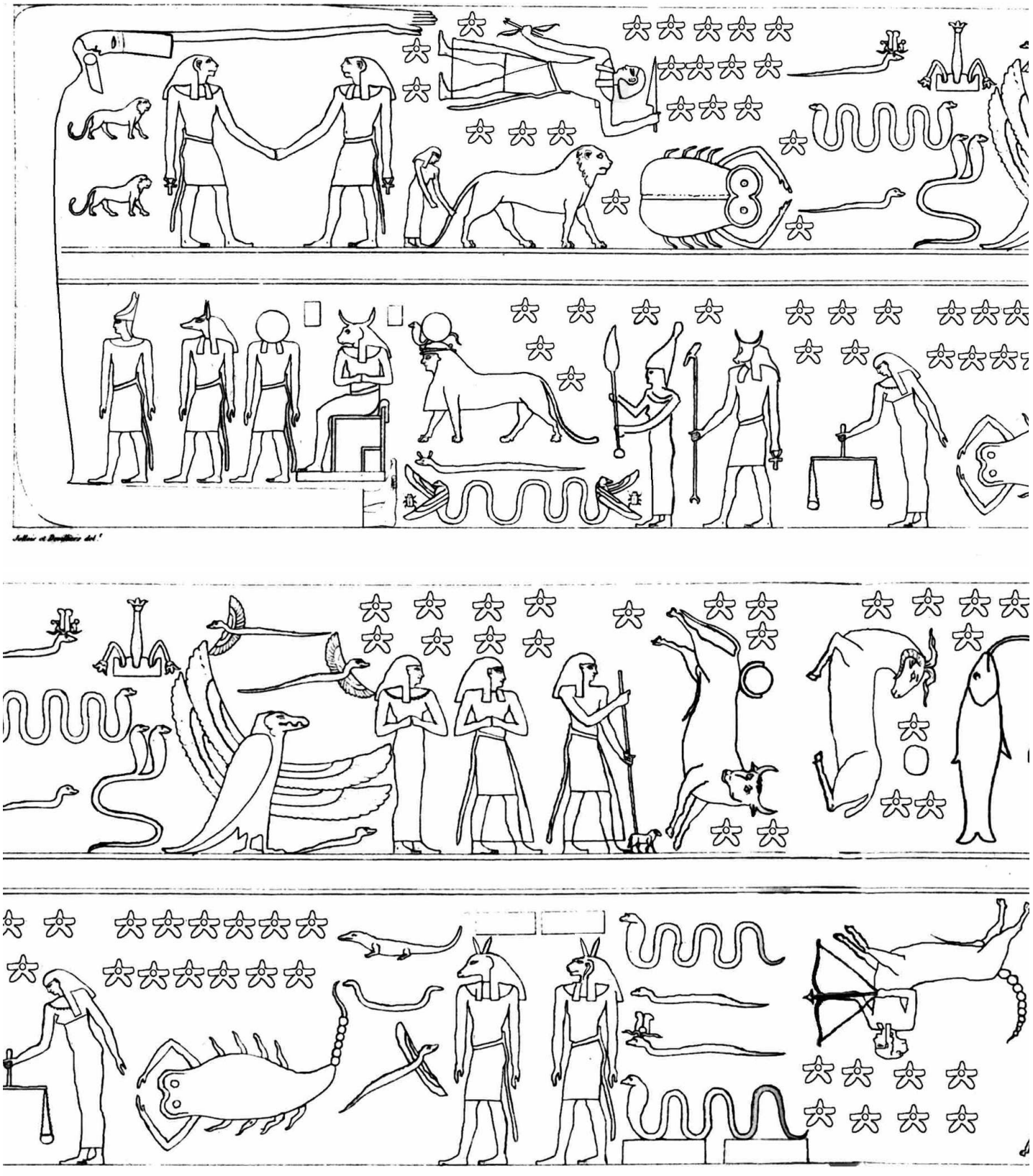

Figure 7.31: *The enlarged fragments of the left half of the Big Esna zodiac.*

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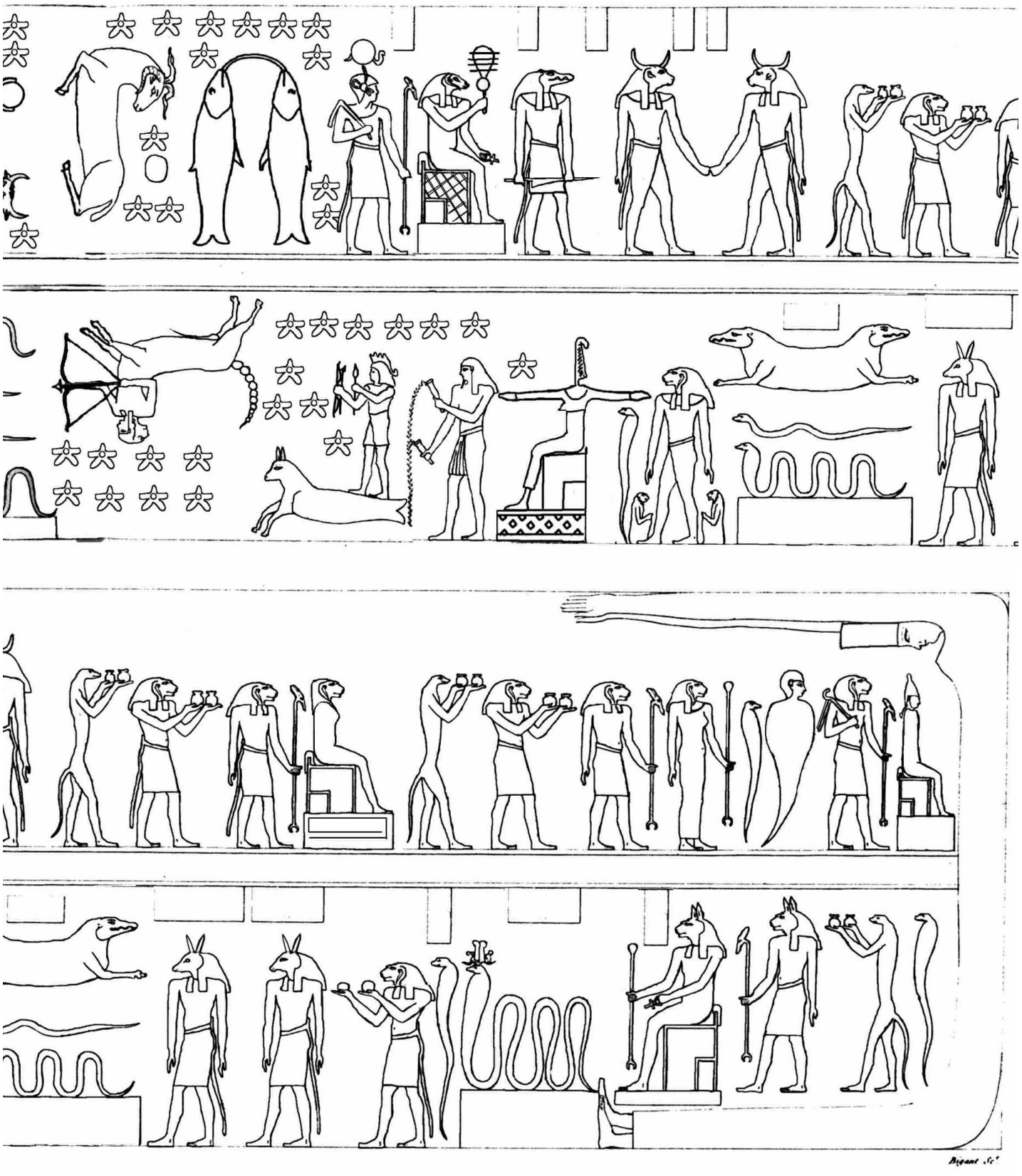

Figure 7.32: *The enlarged fragments of the right half of the Big Esna zodiac.*

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5.13). However, on the Big zodiac the balance is placed in a hand of a female figure (see Figure 7.31), which we do not consider to be a part of the Libra symbol. According to our understanding, this female belongs to the partial horoscope of the winter solstice, what is indicated by its location (see subsection 5.1.7 for more detailed explanation). This identification is also confirmed by the existence of the full solution for the Big zodiac, in which this figure indeed corresponds to Venus in the partial horoscope. We will discuss this issue later in this section.

This same can be said about the symbol of **Virgo**, which is also shown in a similar way as on the Denderah zodiacs — it is a figure of a woman holding a spike in her hand. In front of her, there is a lioness with a human face. These two figures are clearly separated, thus the lioness is not a part of the Virgo symbol, but it is most probably related to the partial horoscope of the autumn equinox on the Big zodiac. We should mention here that the arrangement of symbols of a lion and a woman could be at the first glance mistaken for the symbols of Virgo and Leo. On the Egyptian zodiacs, Leo is often shown with a woman standing on his tail, or holding it by hand (see subsection 5.1.5). However, this identification wouldn't be correct here. This symbol can not represent Leo, but something else. A little further on the zodiac, there is another figure of Leo, so the figure of lioness with a human head cannot represent the Egyptian symbol of Leo. By comparing this figure of lioness with other Egyptian representations of Leo, we find out that the usual size proportions are violated here. A figure of a woman representing the *secondary Virgo* (see subsection 5.1.5) is usually much smaller than the symbol of Leo and standing . But here, the female figure is much bigger than the lion figure and it is also not touching it. In addition, this female figure is in fact the main Virgo symbol, so it cannot be considered as the secondary Virgo. On the other hand, the symbol of a lion or lioness with a human face clearly exhibits connection to a *pull-out* symbol — it is located above a snake (see section 5.6). As the figure of Virgo is not related to any *pull-out* symbol, the lioness figure is in fact separated from Virgo and should belong to a partial horoscope. This interpretation was indeed confirmed by the existence of the full solution for this decoding.

There are no other peculiarities among the zodiacal figures on the Big Esna zodiac. On Figure 7.33, we show the color annotated Big Esna zodiac with the figures representing zodiacal constellations marked in red. We refer to section 5.9 for the more detailed explanation on the colors used on the annotated zodiac.

Let us now discuss the **planets in the main horoscope**. In the case of the Big zodiac, the identification of the planets is not especially complicated. Almost all the planetary symbols in the main horoscope can be immediately recognized, some of them even at the first glance.

At once, we can recognize the figure of **Saturn**. It is located just behind Virgo at the left end of the zodiac (see Figure **??**). Saturn is represented here exactly in the same way as on the Denderah zodiacs — a male traveler with a crescent on his head.

Next, we notice on the Big zodiac, that all the figures with planetary walking sticks are divided into five groups — exactly as the number of planets, except the Sun and Moon. In addition, in two of these groups there is only one figure holding a walking stick, while in each of the remaining two groups there are two figures holding sticks, one following another (look at the color annotated zodiac on Figure 7.33, where all these figures are marked in yellow). This information we practically provides as with a key to decode the horoscope.

We are already aware of the ancient tradition of a "dual representation" of Mercury and Venus, i.e. the two inner-circle planets, which always appear, for an Earth-based observer, not far from the Sun. It looks as they hide behind it and then reappear on its other side, which means that they are visible only before the dawn or after the sunset only. Because of this reason, in the ancient astronomy they were considered to have double nature — morning and evening stars. All these issues were already discussed in section 5.4.

Not surprisingly, in one of the pairs of double planetary symbols we can see a female figure. She is followed by a male figure with a lion head (see Figure 7.33). There is no other planetary female figure on the Big zodiac. Therefore, it has to be **Venus**. On the both sides of Venus, not far from it, there are two other sitting on chairs female figures — one figure on the left from Venus and a another one, with a feather instead of its head is located on the right side of Aquarius. We will explain later the meaning of these two complementary figures, but for now, let us just to point out the fact that these are the only sitting female figures on the zodiac. All other sitting figures are male. This could be considered as another indication that this particular planet has female character, i.e. it is Venus.

Another pair of the double planetary symbols with walking sticks consists of two male figures with jackal or dog heads. We can presume that it is a symbol of **Mercury**. One of its "representatives" is sitting on a chair, but still holds a planetary walking stick in a hand, while the another follows him behind. The both figures are located at the left end of the zodiac (see Figure 7.33).

Moreover, between Mercury and, located on its left, the symbol of Aquarius, we can see the whole collection of attributes associated with a "double planet" such as Venus or Mercury, and other attributes that are distinct for Mercury only. Namely, 1) two male figures, looking almost like Mercury in similar pose and with the same heads; 2) two-headed animals; 3) two small identical animals facing each other; 4) a sitting on a chair female figure with arms spread apart and feather instead of head (a symbol of Mercury — see subsection 5.4.10). Consequently, Mercury was in Aquarius or next to it.

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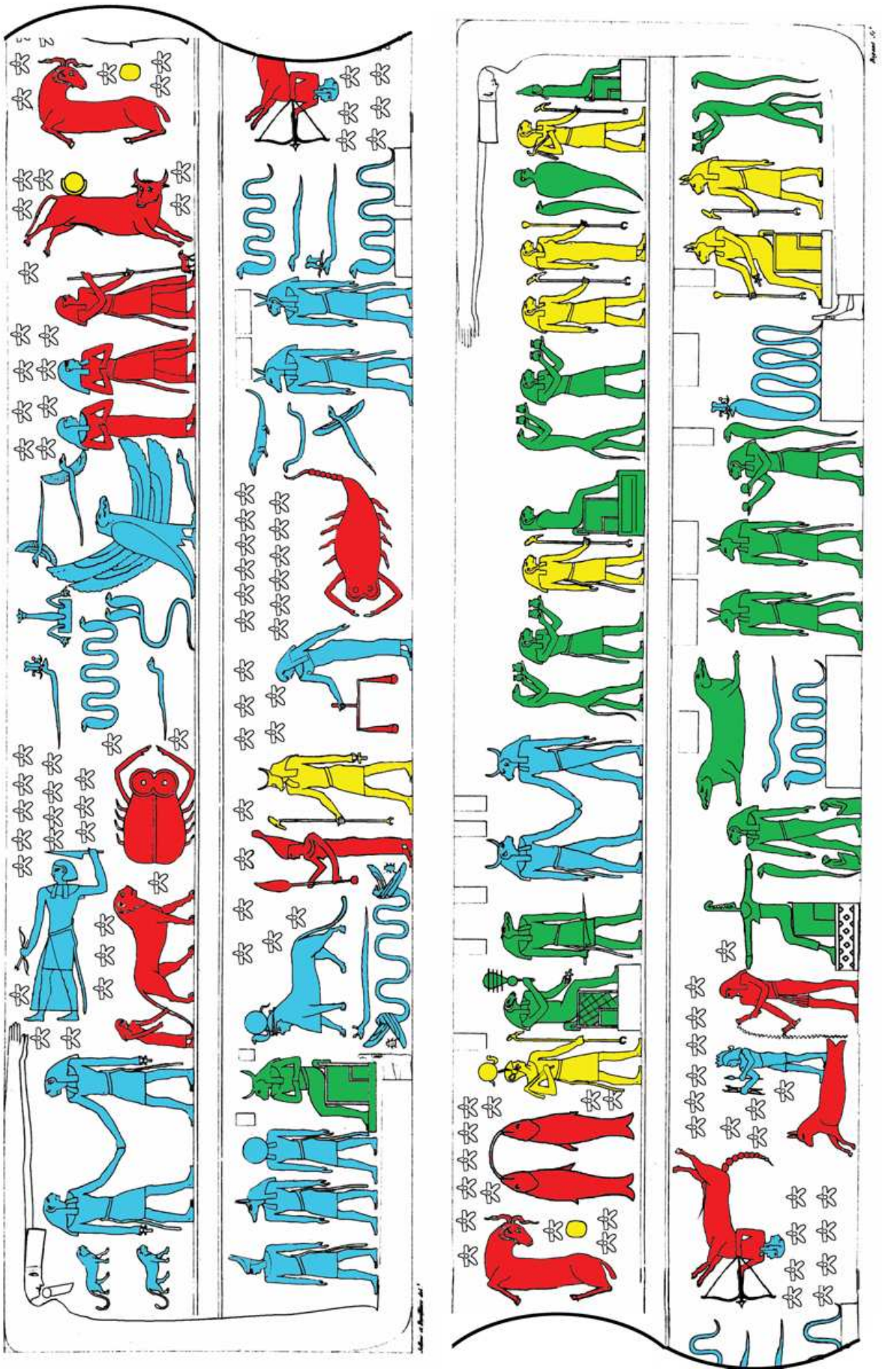

Figure 7.33: *Color annotated Big Esna zodiac "EB."*

The remaining three planetary figures of the main horoscope are less evident. The first — a man holding a planetary walking stick located on the right from Venus at the very end of the zodiac. The second one is a male figure with a lion head holding a planetary walking stick, which is located on the left from Venus, right behind the sitting female figure (see Figure 7.33). The third one is the male figure with a disc over its head, standing on the right from Pisces.

Since all the planets of the main horoscope, except Jupiter and Mars, are already identified, these three figures represents Jupiter and Mars. We do not assume what planet is represented each of these two figures and consider the both variants as equally possible. However, we can reveal in advance that the male figure holding a whip over his shoulder is **Mars**, while the two other planetary figures — one with a lion head, and the second with a disc over its head, symbolize **Jupiter**. That means, Jupiter has also a double representation on the zodiac.

Moreover, in contrast to the Denderah zodiacs, where considerable difficulties were encountered in the identification process of the Sun and Moon, the both "planets" — the Sun and Moon, are very precisely and unambiguously shown on the Big zodiac. On the whole zodiac, there are present only two disks — one between Aries and Pisces, and the other on the hips of Taurus. In addition, the one on Taurus is placed on a moon crescent, while the other one is represented by a simple circle, without a crescent. Therefore, the most likely **Moon was in Taurus and the Sun in Aries**. This variant is strongly supported by the final full solution.

In order to avoid a possible mistake, we've also analyzed all the possible, although less probable, variants of identification of the Sun and Moon on the Big zodiac. Namely, the variant with the disk on crescent in Taurus as the Sun at New Moon, and the circle between Aries and Pisces as Full Moon. But, there was no solution found for this identification, so this decoding had to be rejected.

As a consequence we obtained the color annotated Big Esna zodiac, which is shown on Figure 7.33.

In this way, almost all the planets in the main horoscope could be definitely identified during the preliminary analysis. The only variants of decoding were related to possible Sun-Moon and Mars-Jupiter configurations. However, this uncertainty was quickly clarified already at the beginning of the astronomical computations. In fact, there were only ten preliminary solutions for the big Esna zodiac among which only one complete solution was selected.

The resulting small number of preliminary solutions can be explained. Notice that all the planets-travelers in the main horoscope, except Saturn, are located between the symbols of Pisces and Aquarius. Moreover, the region between Pisces and Aquarius occupies almost a half of the zodiac, thus it is logical to expect that it contains almost all the planetary processions. Simply, on this date encoded in the main horoscope on the Big zodiac, all the planets gathered around that particular location on the ecliptic.

From the point of view of the astronomical dating, this type of situation is very fortunate. Actually, for this particular planetary configuration we can carry on the computations without specific identification of all the planets, except Saturn. It is obvious that all these planets were either in Pisces or Aquarius.

The computations were done for all possible other variants of decodings, but among the obtained preliminary solutions there was no one that could be qualified as a complete solution. In this way, the existence of the unique final solution confirms that our identification of the planetary symbols is also unique. Moreover, all the symbols on the Big Esna zodiac match perfectly the corresponding symbols on the both Denderah zodiacs (see sections 5.1 and 5.4). In other words, there is no inconsistency in the identification of the astronomical symbols on the Esna and Denderah zodiacs. However, the Esna zodiacs possess particular features that are distinctive. Such particularities are visibly present on the Small Esna zodiac, which we will discuss in the next section.

In our further analysis of the Big Esna zodiac we will implicitly refer to the color annotated zodiac on Figure 7.33 as well as to the enlarged pictures of the zodiac on Figures 7.31 and 7.32.

7.5.3 Main Horoscope and "Double" Planetary Symbols on the Big Esna Zodiac

The planetary symbols on the main horoscope on the Big zodiac were already discussed in detail in the previous subsection. Thus, we need only to describe their locations among the zodiacal constellations.

(1) Saturn — a male figure with a bull-head and a crescent on his head. It is located between Virgo and Libra.
Consequently, Saturn on the Big zodiac is either in Libra or Virgo, so the range of admissible positions of Saturn is Libra and Virgo.
As the best point for Saturn we consider the middle of Virgo. We didn't choose it on the boundary between Libra and Virgo, because in Virgo there is another similar to Saturn figure — a sitting "double" of Saturn (on Figure 7.33 this figure is marked in green). It has also a crescent on his head and bull-face, except it is sitting without a walking stick.

Consequently, we chose as the best point for Saturn the middle of Virgo. However, in the final solution the Saturn was located on the boundary between Virgo and Libra, corresponding exactly to the location of the "walking" figure of Saturn.

Let us point out the occurrence of the "sitting doubles" on the Big Esna zodiac. Such "doubles' can be found for almost all of the planets, except for the Sun and Moon. Mars has a "double" which is a sitting figure in front of it, Jupiter's

"double" is the sitting figure in front of the Jupiter's figure standing on the right from Pisces. On the color annotated Big zodiac, all these "doubles" are marked in green.

Since all the "doubles" are located in a proximity of the original figures, so it possible that they represent the planetary symbols in the partial horoscopes. In this case, all these figures, as they are located between Pisces and Aquarius, except the "double" of Saturn, would belong to the partial horoscope of the spring equinox. It is not difficult to notice that the spring equinox was close to the date of the main horoscope. Indeed, the Sun is shown in Aries, but the spring equinox point is located in Pisces, which is right next to Aries (see subsection 5.8.3). Consequently, it is indeed possible that all the "doubles" are the figures from the partial horoscopes, and their positions should be close to the locations of the planets in the main horoscope.

However, in this case the "doubles" can not give any additional information that would help to validate the preliminary solutions. It is clear that there is nothing new that couldn't be already deducted from the main horoscope. Moreover, there is not enough evidence to consider these figures as parts of the partial horoscope. It is also possible that they simply accompany the planetary symbols in the main horoscope.

Let us discuss the other planets of the main horoscope on the Big zodiac.

(2) **Mercury, Jupiter, Mars** and **Venus** are shown, as we already discussed it in subsection 7.5.2, between Aquarius and Pisces. Consequently, the range of admissible positions of all these planets are Aquarius and Pisces. Moreover, as we already explained in the previous subsection, there are only two possible variants for the order of these planets on the ecliptic, from Aquarius to Pisces: **Mercury**–**Mars**–**Venus**–**Jupiter** or **Mercury**–**Jupiter**–**Venus**–**Mars**.

(3) Let us discuss now the Sun and Moon. The Sun is shown between Pisces and Aries, therefore the range of its admissible positions is Pisces and Aries. The Moon is shown on the hips of Taurus. Therefore, its location is most likely in Taurus or eventually in Aries, but it is also possible that the picture indicates the location of the Moon exactly in between Taurus and Aries. Consequently, the range of admissible positions of the Moon is Taurus and Aries.
Let us remind, that we have to consider another variant of decoding, in which the symbols of the Sun and Moon were switched (see the previous subsection). Let us mention that in the final solution the Sun was located on the boundary between Aries and Taurus, while the Moon was in Taurus (see subsection 7.6.6).

7.5.4 Invisibility Attributes on the Big Esna Zodiac

On the Big Esna zodiac the visibility attributes of the planetary symbols are completely different from those used on the Denderah zodiacs. Let us recall that on the Denderah zodiacs, the visibility of a planet was indicated by a symbol of a star placed above the head of the figure representing the planet. When the planet was invisible, the star above the head was not present.

On the Big zodiac it is just opposite. The visibility of a planet was not indicated, while its invisibility was designated by a symbol of a disk replacing the head of a figure. From the astronomical point of view, this convention is understandable. Indeed, a planet becomes invisible when it disappears in the rays of the Sun — hides behind the Sun. That's why a disk — the symbol of the Sun, covers the head of such a figure.

All the planetary symbols, which are shown in the main horoscope as visible. However, some planets in the partial horoscope of the autumn equinox have the invisibility attributes. We will discuss this issue in the next subsection.

7.5.5 Partial Horoscopes on the Big Esna Zodiac

[A] **Partial Horoscope of the Autumn Equinox in Virgo.** In the region of this partial horoscope on the Big zodiac we see the figures, which most likely indicate the planetary symbols in this horoscope, or the additional astronomical symbols that should be explain in the context of the final solution. These symbols are:

On the left from Virgo, we see a lioness with a human face and a disk on its head. As we already explained, this figure doesn't belong to the symbol of Virgo, therefore it is related to the partial horoscope, what is also confirmed by the fact that it is standing over the symbol of the autumn equinox — a two-headed snake (see subsection 5.8.1 for more information about the symbols of the autumn equinox). Hence, this symbol of lioness symbolizes Venus, which on the Egyptian zodiacs was often shown in this way (see subsection 5.4.8). There is also another female figure behind Virgo, which holds Libra in her hand. This figure also represents Venus, because it is the only female planet. However, this figure of Venus should belong to the partial horoscope of the winter solstice, whose region spreads on the right from Libra. Therfore, we should look for the other planets belonging to the partial horoscope of the autumn equinox in the region on the left from Virgo in the direction of Leo.

Preceding the lioness, there is the sitting "double" of Saturn. Since Saturn, which is a relatively slowly moving planet, was located in the main horoscope either in Virgo or Libra, it should also be located in the same area on the day of the autumn equinox.

Next, there are three figures. The first one has a disk instead of a head, which for this planet signifies the attribute of invisibility because of its proximity to the Sun. Two other figures represent visible planets. That means,

we have here two visible and one invisible planet, all of them are male planets.

After that, following the bended body of the goddess Nut, we switch to the upper part of the horoscope and proceed in the opposite direction — from the left to right. Right in the beginning there is a pair of two male figures with lion heads holding their hands, which is a symbol of the autumn equinox (see subsections 5.8.1 and 5.8.3). This means that we are still in the region of the autumn equinox.

After that, there is the symbol of Leo with the *secondary Virgo* holding its tail. Above them, there is a representation of a warrior, holding above his head a large knife or a sword, ready to kill somebody, and a bowl and arrows. The most probably, this figure represents Mars or Saturn. Since it is shown above the secondary Virgo or Leo, this planet could be located either in Virgo or Leo. But we can not exclude the possibility that this figure could belong to the partial horoscope of the summer solstice. Indeed, it is located on the boundary between these two partial horoscopes.

At this location, there is the end of the area of the partial horoscope of the autumn equinox. The figure of a warrior is followed by the symbol of Cancer with the subsequent figures of the summer solstice partial horoscope (see subsection 5.8.4).

In this way we have obtained the following description of the partial horoscope of the autumn equinox: Venus was in Virgo, possibly it wasn't visible (notice the symbol of a disk on the lioness' head). Moreover, in Virgo there were three other planets as well, one of them was invisible, while the remaining two were visible. Next, Mars or Saturn was located either in Virgo or in Leo. If it is not the case, then this planet should be located there on the summer solstice day.

[B] **Partial Horoscope of the Winter Solstice in Sagittarius**. The symbol of Sagittarius on the Big zodiac is again a carefully composed astronomical hieroglyph containing a minimal partial horoscope. It indicates the summer solstice point, but doesn't provide us with any additional information. A little further, there is a small male figure standing on Capricorn. It looks like a warrior wearing a helmet and holding a bow with arrows. Therefore, it is Mars, which was often associated with gods of war. Consequently, we can conclude that Mars was located in Capricorn on the winter solstice day.

Notice a cluster of snake symbols on the left from Sagittarius. These are the symbols particular for the summer solstice point (see subsection 5.8.2). A little further, there are two male figures with jackal heads. In this way could only be shown Mercury — a "double" male planet. With regard to the use of the jackal head for the Mercury symbol, we refer to section 5.4.

Finally, in front of Scorpio, there is a female figure holding the symbol of Libra in her hand. We have already discussed this symbol above, where we found out that this symbol represents Venus in the partial horoscope of the winter solstice, what means that on the day of the winter solstice Venus was in Libra.

In this way we have obtained the following partial horoscope of the winter solstice: Mars in Capricorn, Mercury in Sagittarius or Scorpio, Venus in Libra.

[C] **Partial Horoscope of the Spring Equinox in Pisces.** Like on the other Egyptian zodiac, this horoscope is not present on the Big Esna zodiac, what could be explain by the fact that the main date is close to the spring equinox date. However, it is also possible (see the previous sections) that this horoscope was indicated by the "doubles" of the planetary figures. But even if this was the case, we still don't get any additional information. The reason for it is that the partial horoscope would simply repeat the main horoscope, and consequently, it would be satisfied automatically by every preliminary solution.

[D] **Partial Horoscope of the Summer Solstice in Gemini.** This partial horoscope on the Big Esna zodiac is almost empty, except for the symbol of Gemini, which as usual, is represented as an astronomical hieroglyph. This symbol contains a minimal partial horoscope of the summer solstice, with Venus represented by the female figure and Mercury by the male figure (see subsection 5.8.4). On the left from Gemini, we can see a gathering of the summer solstice symbols (see subsection 5.8.4), which are located between Gemini and Cancer (see Figure 7.33). Here, there is only one symbol that eventually could symbolize a planet — a two-headed snake, which could indicate Mercury (see subsection 5.4.10). But it could possibly symbolize Venus as well, because it is also a "double planet."

In any case, we obtain that the partial horoscope of the summer solstice on the Big zodiac is minimal, consisting of Mercury and Venus only. In addition, one of these two planets, probably Mercury, was represented by the two-headed snake located in between of Gemini and Cancer.

Let us remind that there is also a possibility that the figure of a warrior representing Mars or Saturn, which is located above secondary Virgo and Leo, could also be related to the partial horoscope of the summer solstice.

7.5.6 Final Solution for the Big Esna Zodiac: March 31 — April 3, 1394 AD.

A complete solution for the Big Esna zodiac turned out to be unique. It is **March 31 – April 3, 1394 AD.**

The input data that we used for the computations done with the help of the program *Horos*, is included in Appendix **??**.

On Figure 7.34, we present the final decoding of the Big Esna zodiac, for which the above solution was obtained. Moreover, it turned out that the planets in main horoscope on the Big Esna zodiac were located as follows:

The Sun — the circle in Aries. During the days March 31 — April 3, 1394, indicated in the final solution,, the Sun was crossing the boundary between Aries and Taurus and entering Taurus.

The Moon — the circle with a crescent on the back of Taurus. On the days of our solution, the Moon was moving in Aries and Taurus, but in Aries it was invisible. Moreover, on April 3, 1394, the New Moon reappeared in Taurus, right in Pleiades star cluster. In the medieval astronomy the Pleiades were given special consideration because of their distinctive appearance on the night sky. According to the results obtained by using the program Turbo-Sky, the Moon was not visible on the sky from March 31 till the evening of April 3, when a tiny crescent of the New Moon appeared in the Pleiades inside the Taurus constellation (see Figure 7.35).

On April 3, 1394 — the last day of the solution, Moon reappeared in Taurus in a shape of a tiny crescent.

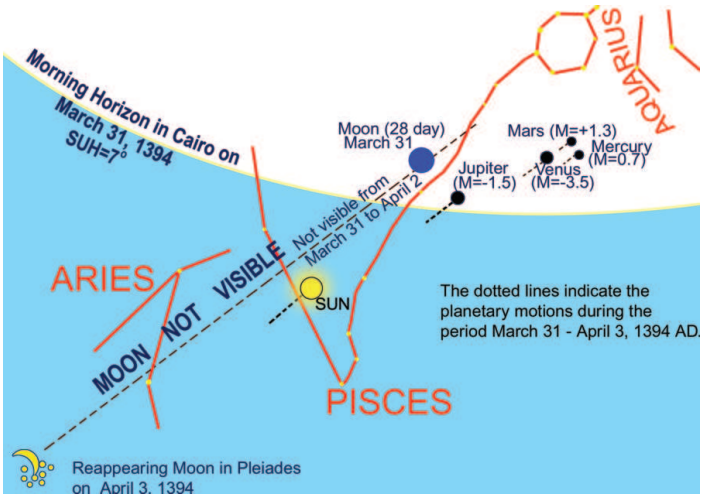

Figure 7.35: *Planets in the proximity of the Sun on March 31 — April 3, 1394 A.D. The area under the horizon is shaded. The dotted lines indicate the trajectory of the planets during these dates.*

Let us now discuss the other planets in our solution.

Saturn in our solution was located exactly on the boundary between Virgo and Libra, which is the same location as the principal figure of Saturn on the main horoscope of the Big zodiac. Notice that the male figure of a traveler with a crescent on his head and holding a planetary walking stick, which represents Saturn, is placed precisely in between the symbols of Virgo and Libra (see Figure 7.33).

Next, Jupiter, Mercury, Mars and Venus were gathered in Pisces, which again is exactly the same location as it was indicated on the Big zodiac. Furthermore, they all appeared very close one to another — the maximal distance between them was not larger than 10^o, while the distances between Venus, Mars and Mercury were barely 2^o–3^o. The configuration of these four planets, on the days specified in our solution, is shown on Figure 7.35.

In addition, before the dawn on March 31, 1394, Jupiter raised in Cairo, when the Sun was submerged 7^o under the horizon (in Luxor it was 8^o), and it was the brightness "star" at that time — its brightness was $M = -1.5$, which was the same as the brightness of Sirius. Consequently, Jupiter was visible before the dawn and since, on the days preceeding March 31, the submersion of the Sun under the horizon was smaller than 7^o, this was the first day of its visibility[36] (see subsection 6.7.3 for more information about the visibility of planets). On the last day of our solution — April 3, 1394, when Jupiter was rising, in Cairo the Sun was submerged 8.5^o under the horizon and in Luxor 10^o. That means, Jupiter was even better visible, but still for a short time only. Therefore, this could provide us an explanation for the presence the second figure of Jupiter — a male planetary figure with a disk over his head. It is the last figure in the procession of Jupiter (see the color annotated Big zodiac on Figure 7.33 and Figure 7.34). The presence of the disk signifies the closeness of Jupiter to the Sun — it's like the Sun was "sitting" on Jupiter's "head" and that's exactly what is indicated by our solution. But, there is something else special about this figure — the representations of Jupiter on the Denderah zodiacs are similar to this figure. On the Round Denderah zodiac (see Figure 5.37), there is a hieroglyph over the head of Jupiter consisting of two horns, directed upward, with a small disk in-between, and on the Long Denderah zodiac, Jupiter has horizontal horns and there is also a small disk in-between. Let us recall that at the preliminary stage, we also considered another variant of decoding, in which the figure leading this procession was Mars. By the way, on the Big Esna zodiac, the size of the disk on the head of this figure is much larger than those on the Denderahs zodiacs, what indeed could signalize the Jupiter closeness to the Sun.

In our solution, when moving away from the Sun, Jupiter was the first planet, then we encounter Venus, followed by Mars and next Mercury (see Figure 7.35). However, few days earlier Venus was still behind Mars and Mercury, till March 25, when Venus got ahead of these two planets. Possibly, it could give an explanation to the arrangement of the Big zodiac, where the figure of Mars is enclosed between two sitting "doubles" of Venus — one of them larger (of the same size as "doubles" of the other planets) and another smaller (see Figure 7.35). These two "doubles" in some sense mark the trajectory of Venus in proximity of Mars. The smaller "double" possibly indicates the position of Venus in the past, when it was on the other side of Mars, while the bigger one shows the correct position of Venus with respect to the other plan-

[36] See [27], p. 16.

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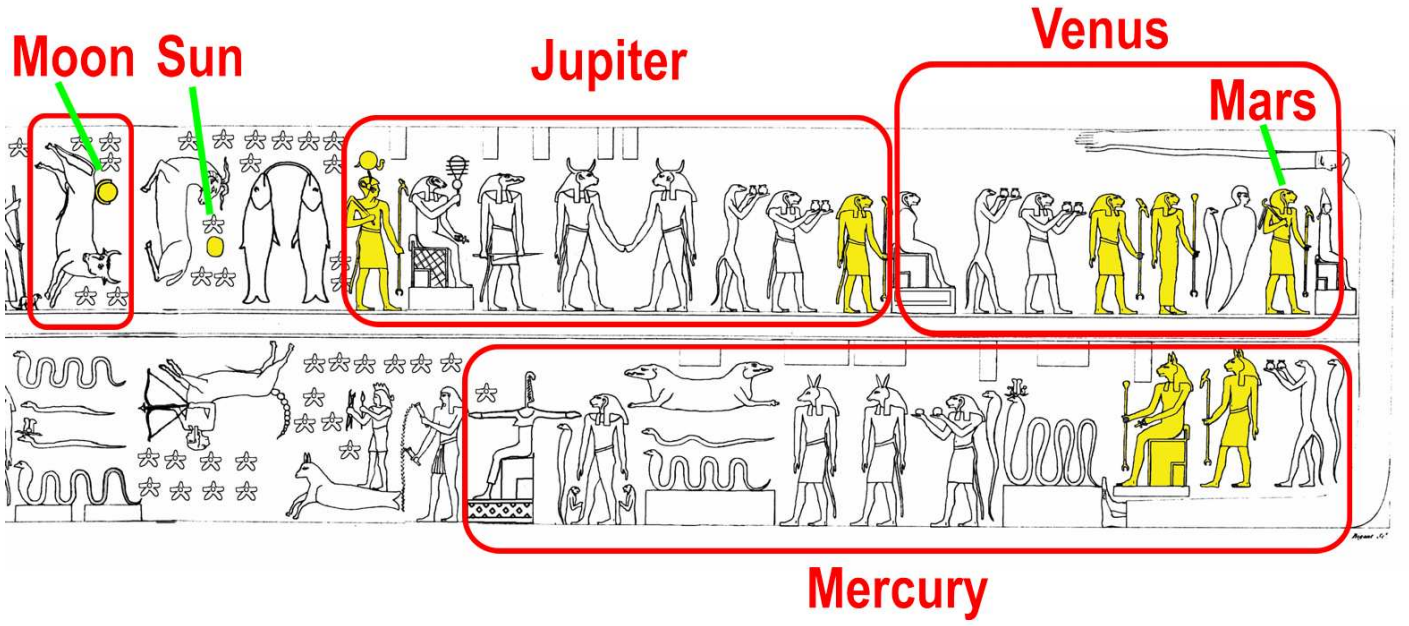

Figure 7.34: *The final variant of decoding for the main horoscope on the Big Esna zodiac, which resulted in a complete solution. We encircled the groups of figures related to the planetary symbols (marked in yellow) on the main horoscope.*

ets for the days shown on the main horoscope (see the color annotated Big zodiac on Figure 7.33, where all the "doubles" are marked in green).

Mars and Mercury on March 31 – April 3, 1394, were located almost at the same latitude, i.e. nearly at the same place on the ecliptic. In this case, on the zodiac, these two planets could be displayed in any order. The planets on the Big zodiac are shown in the following order: Jupiter, Venus, Mars, Mercury (see Figure 7.34).

At the days indicated by the solution, at the time Venus, Mars and Mercury were rising, the Sun was submerged behind the horizon at least 14^o (SUH= 14^o), what practically was a complete darkness. All these planets were well visible before the dawn during the days of our solution, as well as in earlier days.

Moreover, one week earlier than the dates indicated by the main horoscope, on March 25, 1394, all three planets — Venus, Mars and Mercury met at one point on the sky. At that moment the distance from Mercury to Mars, and from Mercury to Venus was only 3 minutes of latitude and the brightness of Venus was $M = -3.5$, the brightness of Mercury was $M = +0.7$, and of Mars was $M = +1.3$. With such large values of brightness, especially the brightness of Venus, and with such small distances separating these planets, they all appeared to an Earth based observer watching the sky by naked eye, as an unusually bright spot. Without doubt, it

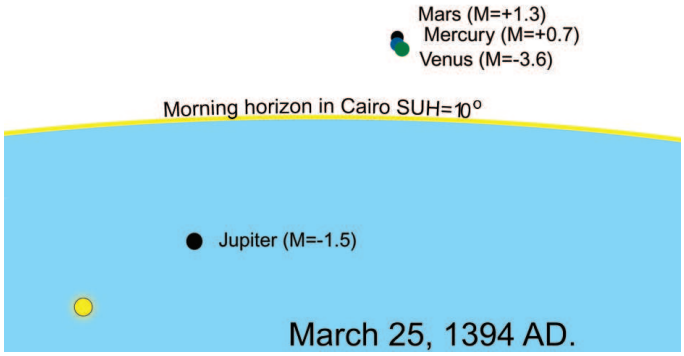

Figure 7.36: *The close meeting of Mercury ($M = +0.7$), Mars ($M = +1.3$) and Venus ($M = -3.6$), before the dawn in the morning on March 25, 1394 A.D. in Cairo.* (The computations were obtain using the program Turbo-Sky)

was an impressive astronomical event. The submersion of the Sun under the horizon at the moment of rising this "triple star" was about 14^o, so it was still the night. On Figure 7.36, we show the configuration of the Sun, Mercury, Mars and Venus, on March 25, 1394, before the dawn in Cairo. At that time the Sun was submerged 10^o under the horizon.

Let us point out, that the Big Esna horoscope was compiled based on the planetary locations after the occurrence of

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this bright astronomical event. The first date of the solution coincide with the reappearance of Jupiter and the last one with the New Moon, that were subsequent to the merger of the three planets. It was exactly one week after the merger, on March 31 when Jupiter became visible, and on April 3, when the New Moon reappear again, which are exactly the dates of our solution.

Consequently, our solution perfectly agrees with the situation shown on the Big Esna zodiac.

Julian day (JD) = 2230306.00 Year/Month/Day = 1394/3/31						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
27.2^o 0.02	378.6^o 11.80	214.8^o 5.98	373.6^o 11.68	359.7^o 11.33	362.8^o 11.41	359.8^o 11.33
Ari/Pis	Pisces	Vir/Lib	Pisces	Pisces	Pisces	Pisces
Mean Distance from the Best Points= 14^o						
Julian day (JD) = 2230307.00 Year/Month/Day = 1394/4/1						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
28.1^o 0.06	31.7^o 0.21	214.7^o 5.98	373.8^o 11.68	360.5^o 11.35	364.0^o 11.44	360.8^o 11.36
Ari/Pis	Pisces	Vir/Lib	Pisces	Pisces	Pisces	Pisces
Mean Distance from the Best Points= 13^o						
Julian day (JD) = 2230308.00 Year/Month/Day = 1394/4/2						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
29.1^o 0.10	44.6^o 0.72	214.7^o 5.98	374.0^o 11.69	361.2^o 11.37	365.2^o 11.47	361.8^o 11.38
Ari/Pis	Pisces	Vir/Lib	Pisces	Pisces	Pisces	Pisces
Mean Distance from the Best Points= 11.5^o						
Julian day (JD) = 2230309.00 Year/Month/Day = 1394/4/3						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
30.1^o 0.14	57.3^o 1.15	214.6^o 5.98	374.3^o 11.69	362.0^o 11.39	366.4^o 11.50	362.8^o 11.41
Ari/Pis	Pisces	Vir/Lib	Pisces	Pisces	Pisces	Pisces
Mean Distance from the Best Points= 11^o						

Table 7.11: *Planetary Positions in the Period March 31 – April 3, 1394*

In Table 7.11, we list the calculated positions of the planets during the days from March 31 till April 3, 1394 A.D., where the dates correspond to the Julian calendar (*year/month/day*). We have indicated the Julian day that was used in the astronomical computations[37] (see section 6.4). The locations of the planets are specified by their longitudes in degrees on the J2000 ecliptic (in the first row) and in coordinates on the constellation scale (in the second row — see section 6.10). The names of constellations, in which a planet was located on the specified date, are placed in the third row.

The astronomical New Moon took place in the days from March 31 till April 2, 1394, i.e. during these days the Moon wasn't visible on the sky. Then, on April 3, the Moon reappeared in Taurus almost at the same location as Pleiades (according to the computations done using the program TurboSky).

The best resemblance to the situation shown on the Big Esna zodiac was realized on April 3, 1394, when the Moon reappeared in Pleiades inside the Taurus constellation. On the Big zodiac, the Moon is shown on the back of Taurus. On April 3, the mean distance from the best points was only 11^o, which is barely one third of the average length of a zodiacal constellation. Let us remind, that the mean distance from the best points of value 15^o, which is about half of the length of an average constellation, is already considered as an indicator of a good correspondence between the figure on the zodiac and the astronomical picture on the sky.

7.5.7 Checkup list for the Big Esna Zodiac Final Solution

In this subsection we present the results of the verification of the final solution (i.e. March 31 – April 3, 1394) obtained for the Big Esna zodiac, with respect to the additional information shown on the zodiac, including the partial horoscopes and the visibility/invisibility attributes. On Figure 7.37, we present the check-up list for this solution. Let us recall that a solution is called *full* or *complete* if a full correspondence between the information on the zodiac and the astronomical situation at the time indicated by the solution can be confirmed (see subsection 6.14).

Column 1: VISIBILITY OF JUPITER. As it turned out in the solution, all the planets were very close to the Sun, therefore it was possible that some of them were not visible. According to the Big zodiac, the figure representing Jupiter has no disk on its head, thus Jupiter should be visible on the days of the solution. Let us recall that in the case of the Esna zodiacs, the presence of a disk on the head of a figure representing planet indicates its invisibility (see our discussion above). Let us recall that on the days of our solution Jupiter was well visible. Indeed, on March 31, 1394, it raised in Cairo, when the Sun was submerged 7^o under the horizon (in Luxor it was 8^o), and its brightness was at that time $M = -1.5$, which was the same as the brightness of Sirius — the one of brightest star on the sky. Such a submersion of the Sun was already sufficient for Jupiter to become visible, so it was its first day of visibility. In the subsequent days Jupiter the submersion of the Sun was even larger at the moment Jupiter was rising, so it was even better visible. In fact, on April 3, 1394, Jupiter raised in Cairo with SUH=8.5^o, while in Luxor $SUH = 10^o$. Consequently, we can annotate the first column

[37] See [27], p.316.

with an encircled sign plus to indicate that the visibility condition for Jupiter is fully satisfied by the solution.

Column 2: VISIBILITY OF VENUS. According to the Big zodiac, Venus was also visible. Again, on the days of our solution Venus was also very well visible, even before the dawn. On March 31, 1394, Venus raised in Cairo when the submersion of the Sun was SUH= 13^o, that means at that time it was still a complete darkness. The brightness of Venus was $M = -3.5$. In the subsequent days, the visibility of Venus was even better. Therefore, we marked this column with the plus sign to show that this condition was also satisfied.

Column 3: VISIBILITY OF MARS AND MERCURY. In our solution, these two planets appeared very close one to another, so they were both either visible or invisible. According to the Big zodiac, Mars and Mercury should be visible on the days indicated by the solution, and indeed, these two planets were visible. On March 31, they both raised at the time when the submersion of the Sun was SUH= 14^o, i.e. it was still a complete darkness. The brightness of Mercury was $M = +0.7$, and that of Mars was slightly smaller $M = +1.3$. In the subsequent days, the visibility conditions for these two planets were getting even better. Consequently, we can annotate this column with the sign plus, to point out that the visibility conditions for Mars and Mercury are also satisfied.

Julian day (JD) = 2230104.00 **Year/Month/Day = 1393/9/10**						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
184.3^o 5.24	230.9^o 6.73	205.5^o 5.76	349.4^o 11.07	207.9^o 5.81	185.0^o 5.25	184.3^o 5.24
Virgo	Libra	Virgo	Pis/Aqu	Virgo	Virgo	Virgo

Table 7.12: *Planetary Positions on September 10, 1394*

Column 4: PARTIAL HOROSCOPE OF THE AUTUMN EQUINOX. As in the case of other zodiacs, we consider the variant of the year beginning in September, i.e. the year of our solution started in September 1393 and ended in August 1394. The exact date of the autumn equinox in that year was on September 10, 1394 (see Appendix **??**), but a possibility of an error of $5-6$ days should be considered. Let us indicate the positions of the planets on the ecliptic on September 10, 1393 (see Table 7.12). In the first row of the number, under the names of the planets, are indicated in degrees the positions of these planets on the ecliptic J2000. In next row, the locations of the planets are expressed using their coordinates on the constellation scale (see section 6.10). On Figure 7.38, we present a drawing of the planets on the sky observed from Cairo on September 10, 1293. On this picture we show the evening horizon observed from Cairo at the moment the submersion of the Sun was SUH= 10^o, i.e. when the most of the stars were already visible, and the morning horizon with the Sun's submersion SUH= 1^o, i.e. when there was already daylight, but Venus and Mercury didn't rise yet. In fact Mercury raised in the same time as the Sun, and Venus even later.

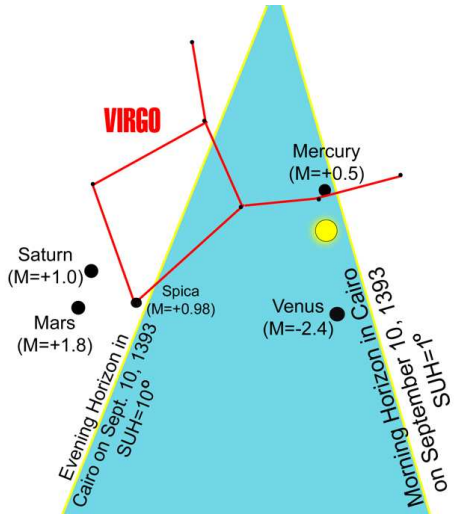

Figure 7.38: *A drawing showing the planetary locations near the Sun on the autumn equinox day on September 10, 1393. (Astronomical computations were done using the program Turbo-Sky)*

It is clear from Figure 7.38 that on September 10, 1393, Mercury and Venus were not visible. Venus was rising after the sunrise, when it was already day, and was setting before the sunset, when it was still daylight. On the other hand, Mercury was located only about 2^o from the Sun, so in no way it could be visible.

However, on the day of the autumn equinox, near the Sun the following planets were visible in the evening:

Saturn ($M = +1.0$) was located, as in the main horoscope, between Virgo and Libra. In the evening on September 10, 1394, was setting when the submersion of the Sun was SUH=14^o, i.e. it was already total darkness. The brightness of Saturn was the same as the brightness of the stars of the first magnitude. That means, Saturn was well visible after dusk and even some time later.

Mars ($M = +1.8$) was located only 2^o from Saturn. Its brightness on this day was only slightly smaller than that of Saturn, but still comparable with the brightness of the stars of the first/second magnitude. Consequently, Mars was also well visible from Cairo on that evening after the sunset and during some time following the sunset. It was also, like Saturn, located between Virgo and Libra.

Moon, which was in the third day of its cycle, was on the autumn equinox day located in Libra. There were no other planets in the proximity of the Sun. Jupiter was on that day

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Figure 7.37: *Check-Up List for the final solution for the Big Esna Zodiac: March 31 – April 3, 1394 AD.*

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on the boundary between Pisces and Aquarius — almost in the opposite to the Sun location on the ecliptic.

In summary, in the year of our solution (starting in September) there was Venus and three other planets in the proximity of the Sun on the day of the autumn equinox, which was on September 10, 1393, in Virgo. One of those planets was Mercury, which was at that time invisible, and two others were Saturn and Mars, which were well visible. Venus was also not visible. Moon was located in the next to Virgo constellation of Libra. There were no other planets around the Sun (see Figure **??**). This situation perfectly agrees with the partial horoscope of the autumn equinox on the Big zodiac, where Venus is indicated in Virgo, and possibly was not visible (there is a disk on the head of the figure representing Venus). Moreover, Mars or Saturn was located in Virgo or Leo. That means the astronomical situation on the autumn equinox day in the year of our solution perfectly fits this description. The only discrepancy that should be pointed out is the absence of the Moon on this partial horoscope on the Big zodiac, in spite of the fact that in our solution the Moon was located in Libra — in the neighboring to Virgo constellation. However, if we carefully analyze the both Esna zodiacs, we will find out that Moon was never shown in any of the partial horoscopes present on these two zodiacs. That is an indication that in the case of the Esna zodiacs, it is possible that the Moon was not included in the partial horoscopes. On the other hand it seems to us that on the Egyptian zodiacs the fact that Moon was usually not shown in the partial horoscopes was rather a rule than exception. The only zodiac, where the Moon was shown in the partial horoscopes, is the Long Denderah zodiac with its remarkable amount of details.

Consequently, we can confirm that our solution perfectly agrees with the description on the partial horoscope of the autumn equinox on the Big Esna zodiac. Therefore, in the forth column of the check-up list for our solution on Figure **??**, we also placed the sign plus to indicate that the required here conditions are satisfied.

Column 5: PARTIAL HOROSCOPE OF THE WINTER SOLSTICE. In the year associated with the solution the winter solstice took place on December 10, 1393 (see Appendix **??**). In Table 7.13, we show the planetary positions on this day, which are as usual indicated in degrees the the ecliptic J2000 as well as using the coordinates on the constellation scale (see section 6.10).

On the winter solstice day, on December 10, 1393, the Sun was in Sagittarius and there were the following planets which were not far from the Sun:

Mars was in Sagittarius in distance of just only 2^o from the Sun, thus it was not visible.

Mercury was in the next to Sagittarius constellation of Scorpio and was well visible. Its brightness was $M = +0.5$ and, at the moment Mercury was rising in Cairo the submersion of the Sun behind the horizon was 20^o, so it still a deep night.

Julian day (JD) = 2230195.00 **Year/Month/Day = 1393/12/10**						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
275.7^o 8.26	359.1^o 11.31	215.5^o 6.00	349.7^o 11.08	273.3^o 8.19	229.9^o 6.68	254.7^o 7.60
Sagit	Aquar	Vir/Lib	Aqu/Pis	Sagit	Libra	Scorpio

Table 7.13: *Planetary Positions on December 12, 1393*

Venus was in Libra, even further from the Sun than Mercury, almost at the very end of the region associated with the partial horoscope of the winter solstice (see Figure 7.39). At that time Venus was exceptionally bright and spectacular. Its brightness was $M = -4.4$, which is was very close to its maximal value.

Jupiter and Saturn were far away from Sagittarius, almost at the same locations as on the main date: Saturn was on the boundary between Virgo and Libra, while Jupiter was on the boundary between Aquarius and Pisces.

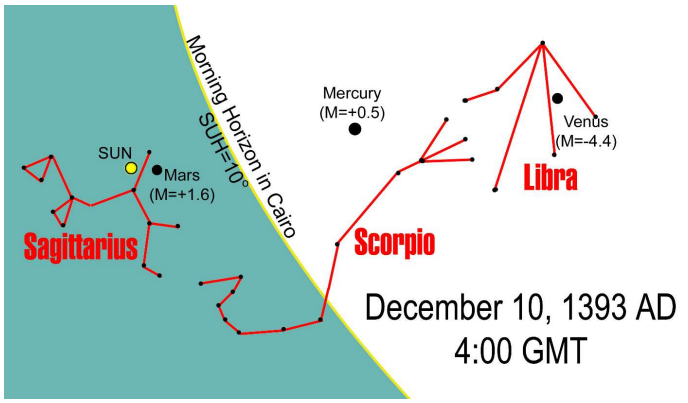

Figure 7.39: *A drawing showing the planetary locations near the Sun on the winter solstice day on December 10, 1393.(Astronomical computations were done using the program TurboSky)*

Let us compare the computations with the situation shown on the partial horoscope of the winter solstice on the Big Esna zodiac. Let us recall that in this partial horoscope Mars was in Capricorn, Mercury was in Sagittarius or Scorpio, while Venus in Libra. Clearly, our results agree with it. Although, in our solution Mars was in Sagittarius, at that time it was very close to the Sun (only 2^o from the Sun), so it was clearly not visible.

Consequently, again we can annotate this column with a sign plus, to signal that the required conditions are satisfied.

Column 6: PARTIAL HOROSCOPE OF THE SPRING EQUINOX. In the year of our solution, the spring equinox occured on March 12, 1394 – just two weeks earlier than the date indicated by the main horoscope (see Appendix **??**). During that time all the planets, with the only exceptions of the Moon and Mercury, couldn't move too far from their locations on the main date. Nevertheless, at that time Mercury was in the process of making a loop and from February 5 till April 19, 1394, so it was staying all the time inside Pisces. Consequently, the positions of all the planets, except the Moon, were very close to their locations on the main date. In this case, as we already pointed it out, the partial horoscope of the spring equinox was on the Egyptian zodiacs usually left empty, or almost empty. However, it is quite possible that in the case of the Big Esna zodiac, this partial horoscope is represented by the doubles of the planetary symbols, what we already discussed earlier. In any case, the partial horoscope of the spring equinox, as it is just a repetition of the main horoscope, cannot provide us with additional information which could be essential for the elimination of inadmissible solutions. Of course all preliminary solutions satisfying the main horoscope, would also satisfy the requirements obtained from this partial horoscope.

Julian day (JD) = 2230287.00 Year/Month/Day = 1394/3/12						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
368.5^o 11.55	121.5^o 3.12	216.1^o 6.03	369.0^o 11.56	344.9^o 10.90	339.6^o 10.59	354.3^o 11.19
Pisces	Cancer	Libra	Pisces	Aquar	Aquar	Pisces

Table 7.14: *Planetary Positions on March 12, 1394*

In spite of its insignificance, just for the sake of completeness, we show in Table 7.14 the planetary positions on the ecliptic on March 12, 1394 — i.e. on the day of the spring equinox.

Therefore, in column 7 we can again put the sign plus as an indicator that our solution agrees with required here conditions.

Column 7: PARTIAL HOROSCOPE OF THE SUMMER SOLSTICE. In the year 1394, the summer solstice occurred on June 11 (see Appendix **??**). In Table 7.15 we list the planetary positions on the ecliptic on the summer solstice day on June 11, 1394.

The Sun on the summer solstice day in 1394 was located in Gemini. In its proximity were only Venus and Mercury — the planets of the minimal partial horoscopes, which are always located not far from the Sun. More precisely:

Venus was located on the boundary between Taurus and Gemini and it was not visible. On that day, when Venus was rising in Cairo, the Sun was submerged behind the horizon only 5^o (according to our computations done with the program Turbo-Sky). Therefore, in spite of its high brightness ($M = -3.4$), Venus completely disappeared in the rays of the Sun. Since there is not big difference between the submersions of the Sun in Cairo and Luxor, Venus couldn't be visible in Luxor neither.

Julian day (JD) = 2230378.00 Year/Month/Day = 1394/6/11						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
96.4^o 11.55	236.6^o 3.12	210.9^o 6.03	28.4^o 11.56	53.6^o 10.90	90.9^o 10.59	122.0^o 11.19
Gemi	Lib/Sco	Virgo	Pis/Ari	Ari/Tau	Tau/Gem	Cancer

Table 7.15: *Planetary Positions on June 11, 1394*

Mercury was in Cancer, in the part bordering with Gemini. It was very well visible. At the moment Mercury was rising in Cairo, the submersion of the Sun under the horizon was 19^o, so it was still a deep night. That means, Mercury was indeed visible.

At that time, there were no other planets present in Gemini or other neighboring with Gemini constellations. Thus, we have to conclude that this partial horoscope is indeed minimal. As we already discussed it earlier, the minimal partial horoscope of the summer solstice on the Egyptian zodiacs is usually incorporated into the figure of Gemini — a male figure representing Mercury and a female figure representing Venus (see subsection 5.8.4). That means that, if there was be no other planetary symbols present except Venus and Mercury, our solution agrees with the partial horoscope of the summer solstice on the Big zodiac. But that is exactly what takes place on the Big zodiac — the partial horoscope of the summer solstice is indeed minimal. Moreover, one of these planets, namely Mercury, was indicated as visible and located in Cancer. Let us recall our argument based on the analysis of this partial horoscope: *one of the planets, most likely Mercury, is symbolized there by an additional figure of two-headed snake located between Gemini and Cancer.*

Consequently, we can annotate this column with the plus sign.

There are no supplementary scenes on the Big zodiac, which could be used as an additional source of information. In this way we have concluded the verification of the checkup list for the big zodiac, and we can confirm that our solution is a complete solution. No other complete solution was found the Big Esna zodiac.

CONCLUSION: The Big Esna zodiac represents the date March 31 – April 3, 1394 AD. It was at the time of a new moon. The best correspondence with the Big zodiac was

achieved on April 3, 1394, when the New Moon reappeared in Taurus, very close to Pleiades.

7.6 Decoding the Date from the Small Esna Zodiac

In the previous section we've presented how was decoded the date shown on the zodiac found inside a large ancient temple in Esna. We called this zodiac simply the Big Esna zodiac. It turned out that this date was pointing at the end of the 14th century A.D. — the year 1394. As we've already mentioned, in another temple in Esna, a second zodiac was also discovered. In this section we will discuss the decoding of the date from that zodiac, which we call the Small Esna zodiac. It is very interesting to compare the dates of these two zodiacs. In the case of the Denderah zodiacs, we found out that the encoded in them dates were very close one to another. The difference between them was only 17 years. Is it a similar situation with the Esna zodiacs? As we will show it in a moment, this is indeed the case. Again, the difference between the dates represented on the Esna zodiacs is barely 10 years.

Let us recall that the ancient city of Esna is located on the west bank of the Nile river, at the south end of the great meander of the Nile, surrounding from the east the Valley of the Kings (see Figure 3.8). It is postulated that the earlier this city was named in Greek Lycopolis[38]. In Esna, besides of the large temple with the Big zodiac, there was also discovered a smaller temple, in which was found another zodiac of similar type. We call this zodiac Small just to indicate its provenance from this much smaller temple, what has nothing to do with the actual size of this zodiac. A drawings of the Small zodiac, which were borrowed from the Napoleonic Album are shown on Figures 2.17 and 2.18.

The small temple was located at the south end of Esna. Europeans who penetrated there during the Egyptian expedition of Napoleon, reported extensive damages to this temple. A drawing (see Figure 7.40) taken from the Napoleonic Description of Egypt[39] shows the extend of its destruction. The Small zodiac was also damaged — one of its fragments was destroyed. Namely, the part of the zodiac containing Scorpio, Libra and Virgo was completely missing. Fortunately, the destroyed part was not crucial for the decoding of the date of this zodiac. In fact, all the planetary figures of the main horoscope were located in the preserved parts of the zodiac (see Figure 5.43).

Let us begin the analysis and decoding of the Small Esna zodiac, which will lead to obtaining the date that was encoded in its design by the "ancient" creators of this zodiac.

For the purpose of dating, we will need a more detailed picture of the Small zodiac. On Figures 7.42, 7.43 and 7.44, we present the enlarged drawing of this zodiac, which we cut into three parts. The size of the figures will allow us to observe all the necessary details needed for the analysis.

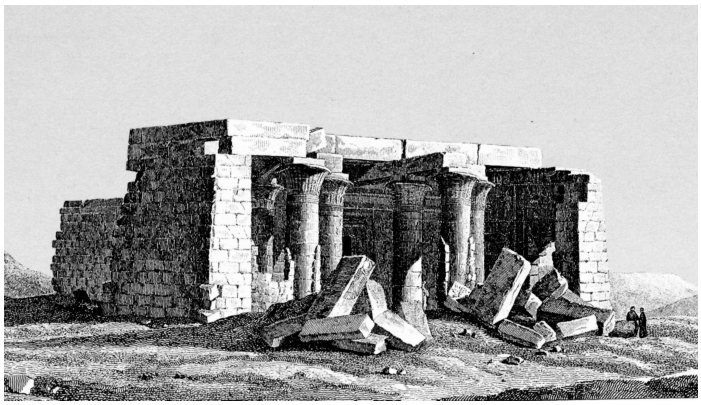

Figure 7.40: *A drawing of the temple in the north of Esna, where the members of the Napoleonic expedition discovered a second zodiac — the Small Esna zodiac.* (See [2], A. Vol.I, Plate 85)

As we've already mentioned, we had no other pictures or photographs of the Small Esna zodiac, except the drawings published in the Napoleonic Album [2]. Unfortunately, the small Esna temple does not exist anymore. Nevertheless, we were quite confident that these drawings are sufficiently precise for the purpose of dating.

We precede with the dating process of the Small zodiac by following the usual steps (see section 6.7).

7.6.1 Color-Annotated Small Esna Zodiac

Step 1. (See subsection 6.7.1.) Decoding of the main horoscope on the Small zodiac and compiling the color annotated zodiac. The color annotated Small Esna zodiac is shown on Figure 7.42.

With the help of the comparative tables of the Egyptian symbols, which were discussed in section 5.1, it is not difficult to recognize all the figures representing zodiacal constellations on the Small zodiac, except those symbols which were located in the destroyed part of the zodiac. All these figure are similar to the corresponding symbols of zodiacal constellations that shown on the Big Esna zodiac, that we discussed in section 7.5. In fact, these symbols are also similar to the constellation symbols used on the both Denderah zodiacs.

On the Small zodiac, we can easily recognize the figures of Leo (accompanied by a figure of *secondary Virgo*), Gemini, Taurus, Aries, Pisces, Aquarius, Capricorn, and Sagittarius. The figure representing Sagittarius is located at the end of the preserved part of the zodiac, and the subsequent constel-

[38] See [2]
[39] See [2].

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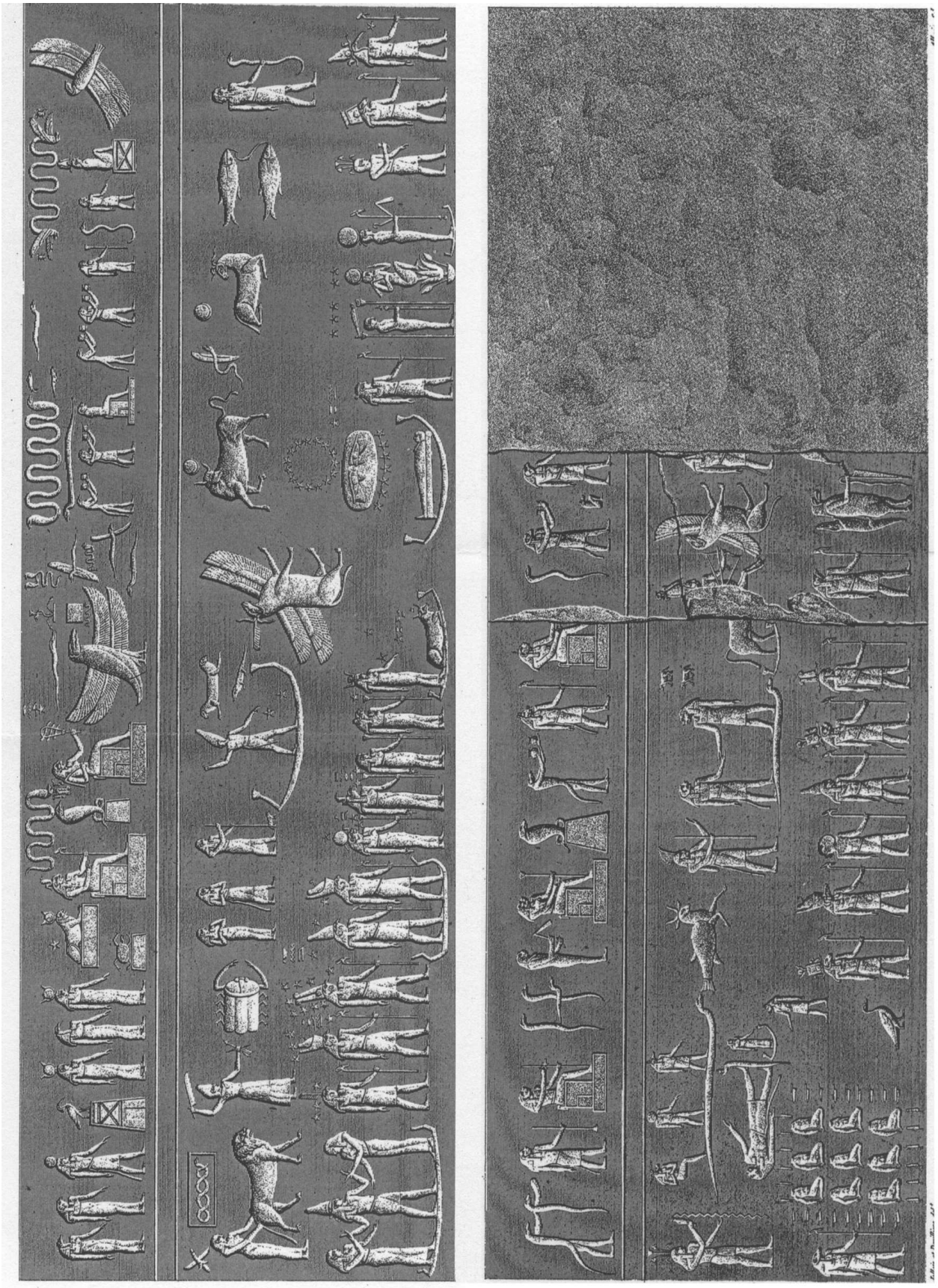

Figure 7.41: *A halftone drawing of the Small Esna zodiac taken from the Napoleonic Album.* (See [2], A. Vol.I, Plate 87)

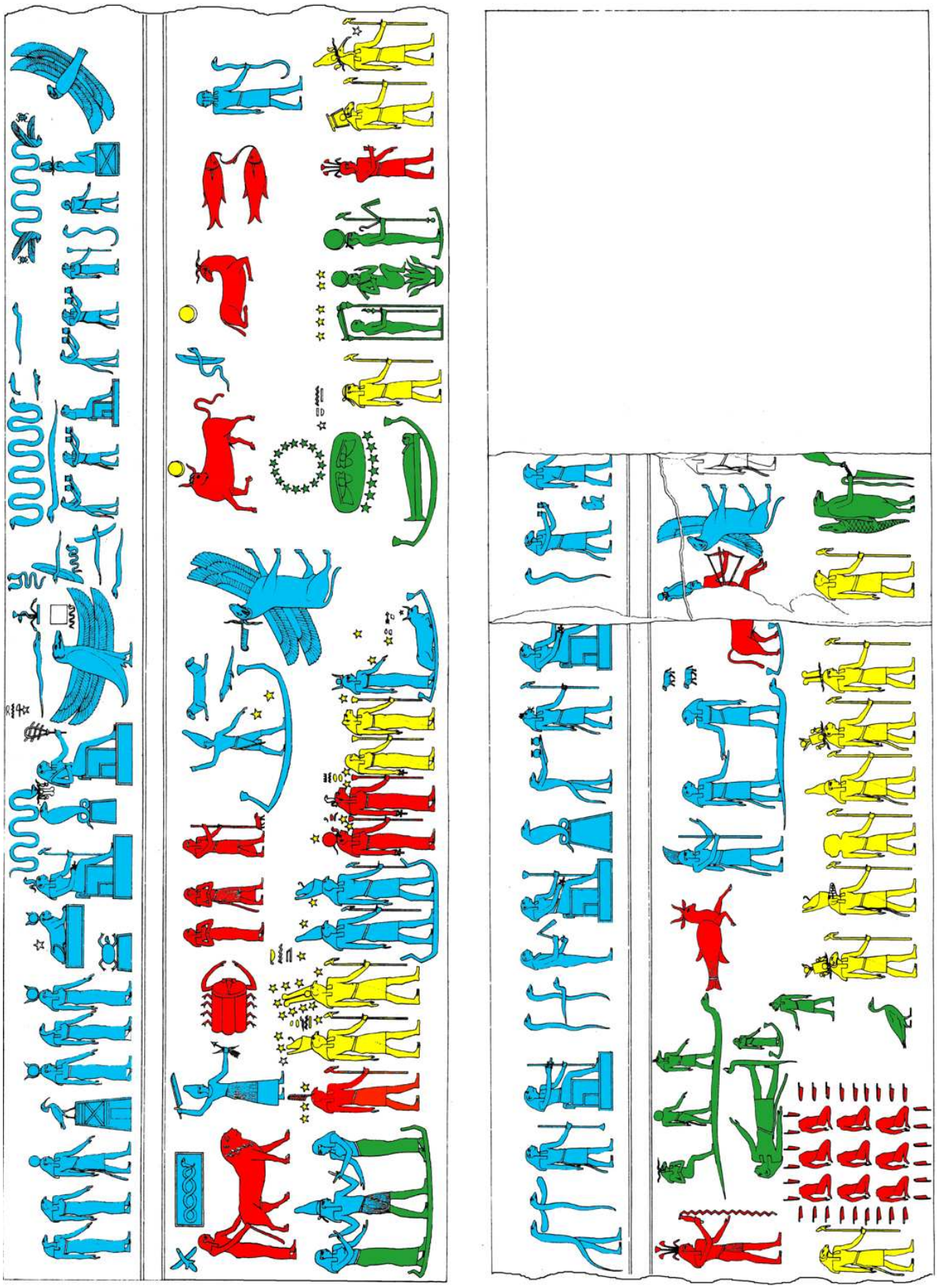

Figure 7.42: *Color annotated Small Esna zodiac "EM."*

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lations of Scorpio, Libra and Virgo were supposed to be in the destroyed section.

All the figures representing constellations on the Small zodiac are located in the middle row. Moreover, notice that all these figures are divided into three sequences (see Figure 7.42).

On the Small zodiac, all the planets of the main horoscope are located in the bottom row. On the annotated zodiac (Figure 7.42), we marked these figure in yellow. Those symbols are all the figures holding the usual planetary walking sticks. In the bottom row there is located a representation of the paschal moon (see subsection 5.9.1 and Figure 5.79), as well as few symbols belonging to partial horoscopes. In particular, there is a scene with a bull lying on a boat with a woman standing behind and shooting an arrow over its head. In spite that the woman holds no bow, still there is a small flying arrow that could only come from her direction (see Figure 7.42). On the color annotated zodiac (Figure 7.42) all the figures belonging to the partial horoscopes were marked with the light blue color.

In the bottom row, there are also few symbols that were marked in red. These are new type of symbols that were not present on other zodiacs. We will call them "constellation brackets." We will discuss them later.

The zodiacal constellations are represented in the middle row. On Figure 7.42 they are marked in red. Beside these figures, we also find it this row several symbols belonging to the partial horoscopes — they are marked on Figure 7.42 in light blue, and a supplementary scene located between Aquarius and Capricorn, which is marked in green.

These two rows represent the main area of the Small zodiac, where the partition into zodiacal constellations is indicated in the middle row. The upper row, which is separated from the main area by two horizontal lines, has its own meaning that is only loosely connected to the lower two rows.

The upper row is entirely associated with the symbolism of the partial horoscopes. On the color annotated Small zodiac (see Figure 7.42), all these figures are marked in light blue to indicate that, without exception, they are the symbols of the partial horoscopes. However, in this row we do not find *pull-out* symbols, which were discussed in section 5.6. The reason for this is simple — as this row is already separated from the main area of the zodiac, there is no need for using here *pull-out* symbols. We can see here the symbols of two equinox and two solstice points, which are located on the Small zodiac in the following order (moving from the left to the right):

The symbol of the autumn equinox — a bird (resembling a heron) standing on a podium with a diagonal cross. This type of a podium on the Egyptian zodiacs symbolizes an equinox (see section 5.8). This symbol is located approximately above the figure of Leo followed by the *secondary Virgo* (see subsection 5.1.5) in the middle row. It is slightly shifted to the right. Right over Leo, in the middle row, there is also another symbol of the autumn equinox — a self-entwined snake (also marked in light blue on Figure 7.42). Let us notice that most probably, the main group of the autumn equinox symbols was located over Virgo (like it is the case with the Big Esna zodiac), in the destroyed part of the zodiac, and the figures shown over Leo are just the end of this sequence.

Next, if we move further to the right in the upper row, we encounter the symbol of the summer solstice — a cobra with upright fore body on a small podium (see section 5.8). Under it, in the middle row, there is a symbol of Gemini symbolized by three walking figures (notice that exactly the same symbol of Gemini was shown on the Big Esna zodiac). Let us recall, that on the Egyptian zodiacs the summer solstice point was displayed in Gemini (see subsection 5.8.4 for more information).

Further to the right, there is the symbol of the spring equinox — a human figure sitting with bended knees on a podium with a diagonal cross. Right under it, in the middle row, there is located the symbol of Pisces, which is the location of the spring equinox point.

Finally, we find the symbol of the winter solstice — a cobra with upright fore body on a podium, which is exactly the same symbol as for the summer solstice point. It is located near Sagittarius, but is shifted slightly towards Capricorn. On the Egyptian zodiacs, the location of the winter solstice point was indicated in Sagittarius.

After that, we encounter the destroyed part of the zodiac, where probably were located the main autumn equinox symbols — at the head of the parade of all the figures on the Small Esna zodiac. This agree with the variant of the Egyptian year beginning in September, i.e. nearby the autumn equinox.

Around each of the above symbols of the solstice and equinox points, are situated the planetary figures belonging to the corresponding partial horoscopes. Particularly "abundant" in symbols is the partial horoscope of the winter solstice, which occupies almost a half of the upper raw on the Small zodiac. The symbols of the partials horoscopes will be discussed again later in this section.

7.6.2 "Constellations Brackets" in the Planetary Row on the Small Esna Zodiac

Let us analyze the bottom row of the Small Esna zodiac. This is a very important part of the zodiac, because it is here where the figures of the main horoscope encoded the date of the Small zodiac. The symbolism of this row turned out to be rather complicated. Contrary to the upper and middle row, where the used symbols were quite standard, we have encountered in this row a completely new and unknown to us usage of symbols, which caused us a lot of trouble in the analysis of the Small zodiac.

Right in the beginning of the decoding of the Small zodiac we noticed that there are exactly five groups of travelers with planetary walking sticks. Each of these groups contains

different number of travelers, but all of them are walking in the same direction. These five groups are separated by other figures — some on the boats, others without walking sticks. As we already discussed it in the case of the Big Esna zodiac, each of these groups should represent a certain planet of the main horoscope. Let us recall that there are five planets of the main horoscope, excluding the Sun and Moon, which were symbolized on the Egyptian zodiacs by figures of travelers. The Sun and Moon were usually shown as discs. Moreover, one of the group of travelers is composed of female figures. It is located under the figures of Gemini in the middle row, and slightly extended into the direction of Taurus. That's exactly how it should be. In the old astronomy there was only one female planet — Venus. However it was somehow strange that Venus was represented here not, as usual, by two, but four figures. In addition, two of these figures were larger, while two other were definitely smaller. At that moment it was not clear what possibly it could mean. Nevertheless, without doubt it was a representation of Venus. The identification of the other planets was less evident, but still possible based on our understanding of the planetary symbolism in the main horoscope on the Egyptian zodiacs (see section 5.4).

Unfortunately, when we tried to date the Small zodiac based on the planetary locations on the ecliptic indicated by the positions of these groups with respect to the zodiacal symbols, we didn't succeed to get any full solution. We looked under what constellation symbol (or symbols) in the middle row were located the figures of the planetary procession in the bottom row. We considered all the possible variants of identification of these groups with the planets, as well as the variants for the Sun and Moon. In spite of all these efforts, we were not able to find any solution satisfying the symbolism of the partial horoscopes.

Only later, after spending some time on thinking and analyzing the Small zodiac, we turned our attention to some "non-planetary" figures in the bottom row. One can easily notice there two special symbols usually associated with the constellation of Aquarius. The first one was a male figure located right under Pisces. Its head is decorated with an ornament, which is on Egyptian zodiacs particular for Aquarius (see subsection 5.1.11). Exactly the same ornament is shown on the figure representing Aquarius in the middle row. The second symbol, in the bottom row, is composed of nine beheaded human figures surrounded by series of knifes arranged a rectangular shape. This symbol is located slightly to the right under the figure of Aquarius in the middle row. This is again a familiar symbol on the Egyptian zodiacs, which is associated with Aquarius (see subsection 5.1.11). The most interesting was the fact that these two symbols were separated with one group of planetary symbols placed in between them. It looked like this group was in some way enclosed in between two *Aquarian brackets*. At that moment, an idea emerged that the Egyptian artist, who created this zodiac, tried in this way to point out that this planet was actually located in Aquarius. Without this indicator, it was possible to relate this planetary symbol not only to Aquarius, but also to Pisces. However, the presence of the *Aquarian brackets* for this particular planet didn't produce any significant change in the decoding process. In any way, we were obliged to consider all variants with this planet located in Aquarius as well as in Pisces.

Nevertheless, this simple observation of the existence of the *Aquarian brackets* in the bottom row of the Small zodiac brought us to a suspicion that there may be more similar *Zodiacal Brackets* present on the bottom row. This could possibly result in more substantial shifts of the actual locations of the planets on the zodiacal belt. We were asking ourselves if the reason for not getting a complete solution for the Small zodiac was caused by the wrong identification of the planetary positions among the zodiacal constellations. If there was in fact a significant "displacement" of the bottom row with respect to the middle one, the resulting error could lead to an incorrect decoding of the main horoscope. In this case the obtained solutions naturally disagree with the symbolism of the partial horoscopes, so no complete solution couldn't be found.

As it turned out, indeed this was exactly the case. In the bottom row on the Small zodiac, there is another pair of *zodiacal brackets*. We have to recognize the craftiness of the Egyptian artist, who did not use for this purpose the same symbol of Gemini as it appears in the middle row of the Small zodiac, but adopted its standard form. Let us recall that on the both Esna zodiacs, the symbol of Gemini is rather unique. It is composed of three figures, while on the majority of other Egyptian zodiacs the symbol of Gemini is shown as an astronomical hieroglyph composed of two figures endowed with the attributes of the minimal partial horoscope of the summer solstice (see subsection **??**). One of these figures is a male symbolizing Mercury, and another one is a female denoting Venus. On the head of the male figure there is a feather — an attribute of Mercury, while on the head of the female there is always a disk with a snake (see Figure 5.72). On the Small zodiac, one can localize such a pair of figures in the bottom row in the area under symbols of Leo, Cancer and Gemini in the middle row. They are the *Gemini brackets* on the Small zodiac. These figures are marked on the color annotated zodiac in red (see Figure 7.42). This *bracket* encloses exactly one planetary group composed of two figures together with a p pair of symbols on a boat, which in this case are the symbols related to the partial horoscope (see section 5.6).

Consequently, the planet shown in between the *Gemini Brackets* was located in Gemini, while the other planets were not in Gemini. This observation changes significantly the decoding of the main horoscope. Notice that the planet surrounded by the *Gemini Brackets* is located right under Cancer. If there were no *brackets* around these planetary symbols, it would be very questionable to associate this planet with the Gemini constellation. In addition, without these *brackets*, it would be impossible to consider the group of Venus, which is located exactly under Gemini, as belonging to Taurus. Notice that Venus is quite far from the symbol of Taurus in the middle row. But now, as it is indicated by the *brackets*, it becomes

clear that Venus was either in Taurus or on its boundary with Gemini, outside Gemini. Indeed, Venus is located outside the *Gemini brackets*, on the side of Taurus.

Now it become understandable why in the group of Venus, in which we initially included four female figures with the planetary walking sticks, there were two larger and two smaller figures, while on all the previously analyzed zodiacs Venus was always represented by two figures of the same size. In fact, as it turned out, in the case of the Small zodiac, it wasn't different. Simply, two female figures of the larger size were not related to Venus, but they were a part of the *Gemini brackets*. Their similar to Venus appearance was caused by the association of this symbol with the astronomical hieroglyph of the summer solstice in Gemini, where such a female figure symbolizes Venus (see subsection 5.8.4). On the Small zodiac, this hieroglyph is divided into two parts, which are the *Gemini brackets* in the bottom row.

On the color annotated zodiac, two female figure corresponding to the *Gemini brackets* are marked in red, while two other, which symbolize Venus, are marked in yellow.

7.6.3 Planetary Figures in the Main Horoscope on the Small Esna Zodiac

Let us begin with the Sun and Moon. On the Small zodiac there are only two discs, which could be considered as representations of the Sun and Moon, present. Both discs can be found in the middle row — the first one is located in between the horns of Taurus, and the second one is over Aries. We had a similar situation on the Big Esna zodiac, although on the Small zodiac the two discs are completely identical. Therefore, as it was also a case with the Big zodiac, we have to consider two possibilities:

(1) The Sun in Taurus and the Moon in Aries, or

(2) The Moon in Taurus and the Sun in Aries.

In the full solution, we've obtained later that the Sun was located in Taurus and the Moon in Aries.

All the other planetary symbols, as we already discussed it the previous subsection, are placed in the bottom row of the zodiac. They are arranged in groups of travelers holding walking sticks. It was the most fortunate that all these planetary symbols were located in the preserved part of the Small zodiac. Among these groups only Venus can be recognized without any trouble. For the remaining male planets we had to consider all the possible cases in order to avoid eventual mistakes caused by our subjective judgment in recognizing the male planets symbolized by these groups of travelers. Nevertheless, in the final full solution, we found out that many of ours initial ideas were confirmed. We've already discussed in section 5.4 several specific attributes of the planetary symbols in the main horoscope on various Egyptian zodiacs, which can be used to identify these planets. In particular, we discussed there the planetary figures on the Small Esna zodiac.

Let us list the planetary groups in the bottom row on the Small zodiac and indicate their identification, which was obtained in the final full solution. We begin at the left end of the zodiac, and move gradually to the right side till we reach the destroyed part of the zodiac. On the color annotated zodiac, all these groups are marked in yellow.

The First Planet — the group composed of two travelers holding planetary walking sticks. Both of them wear high hats. According to the full solution, this group represent Mars in the main horoscope. Following them is the male figure, with falcon's head with a feather, holding a planetary walking stick. This figure is the left *Gemini bracket*. That implies that this planet was in Gemini. A small star is placed in front of the face of the first traveler in this group. This is the usual attribute of visibility, which means that this planet was visible. It is quite clear, because according to its location among zodiacal constellations, it was very far from the Sun.

A little further to the right, the same planet (again represented by two similar male travelers) is shown in a boat. That means, this is a symbol of the partial horoscope. We will discuss it later. Further, there is the right *Gemini bracket* symbolized by a pair of female figures holding planetary walking sticks. The *Gemini brackets* were already explained in the preceding subsection. After that, we reach the next planetary procession on the Small zodiac.

The Second Planet — two female figures holding planetary walking sticks. The leading female has the lioness head. This is clearly a symbol of Venus (for more information about Venus symbols see subsection 5.4.8). This pair is located on the right site of the right *Gemini bracket*, i.e. it was not located in Gemini. That means, Venus was either in Taurus or between Gemini or Taurus. There is again a small star in the front of the first female's face, which means that Venus was visible. However, here this is a rather important information, because the Sun could be located in Taurus as well.

The Third Planet — a single male figure with human face holding a planetary walking stick. According to the obtained full solution — this planet was Mercury. It was located under Taurus and Aries, thus Mercury was in Taurus or in Aries. There is no small star around it, so Mercury was not visible.

The Forth Planet — three male travelers, two of them with ram's heads and one with ibis head. According to the full solution — this planet was Saturn (see subsections 5.4.2 and 5.4.3, where we discussed in detail the symbolism of Saturn in the main horoscope on the Egyptian zodiacs). This planet is located in between *Aquarian brackets*, therefore it was in Aquarius. In front of the middle traveler's face there is a small star — an attribute of visibility for this planet. However, it is clear that with such a large distance from the Sun, this planet had to be visible, so even without this attribute (which is could be omitted here) the visibility of this planet is obvious.

The Fifth Planet — the long procession, composed of seven male travelers at the right end of the preserved part of the

Small zodiac. Among them, there are figures with heads of falcon, ram, crocodile, lion, and human. At the very end of this procession there is a goose. Consequently, we can see in the suit of this planet the elements of symbolism related to Jupiter (the lion's head and the characteristic for Jupiter's head decorations), Mars (the falcon's head and goose) and Mercury (the human face and the crocodile's head). According to the final solution this planet was Jupiter (see subsection 5.4.6 for a discussion related to this identification).

Notice that there is no small star near any of the seven figures in this procession. However, it is quite possible that in fact such a star was originally there. The damaged area in front of the second figure could be the place of its location. On the other hand, with such a large distance from the Sun it is clear that this planet was visible, so it is not surprising that in such cases the attributes of visibility could be omitted. We have seen such cases before.

Since this procession is located in the area under the symbols of Capricorn and Sagittarius (standing in the middle row), we have to conclude that this planet was either in Sagittarius or Capricorn.

In this way, the decoding of the Small Esna zodiac, which led to the complete solution, is the following:

The Sun in Taurus.

The Moon in Aries.

Mars in Gemini (it is enclosed in between the *Gemini brackets*). It was visible.

Venus in Taurus or possibly on the boundary of Gemini, from the side of Taurus. It was visible.

Mercury in Taurus or possibly in Aries. It was *invisible*.

Saturn in Aquarius (it is enclosed in between the *Aquarian brackets*).

Jupiter in Capricorn or in Sagittarius.

For this decoding of the Small Esna zodiac we have obtained the full solution: **May 6–8, 1404 A.D**.

7.6.4 Partial Horoscopes and Supplementary Scenes on the Small Esna Zodiac

[A] **Partial Horoscope of the Autumn Equinox**: On the Egyptian zodiacs the partial horoscope of the autumn equinox is located in Virgo and in the neighboring constellations of Leo and Libra (see section 5.8). The fragment of the Small zodiac containing Virgo and Libra was destroyed, however the part with Leo and the *secondary* Virgo standing on its tail was well preserved (see subsections 5.1.5 and 5.1.6 for more details on representations of Leo and Virgo on the Egyptian zodiacs). Therefore, the partial horoscope of the autumn equinox on the Small zodiac seems to be incomplete (see Figures 7.41 and 7.42).

In the upper row, at the left end of the zodiac, there are six figures standing on the both sides of the symbol of the autumn equinox, which is the podium with a diagonal cross and a heron standing on it. There is only one male figure there. It has a small disc on its head. These female figures ought to represent Venus, while the male figure the most probably is Mercury. Indeed, this male figure has a human face — a usual symbol of Mercury on the Egyptian zodiacs (see subsections 5.4.9 and 5.4.10). Further to the right, there are two figures in the upper row — a lion and a beetle resembling scarab — both on small podiums. Right above the lion, there is a small star probably to indicate that on the autumn equinox day that there was a well visible planet in Leo. All these figures basically describe the minimal partial horoscope of Venus and Mercury, but there is also a "suggestion" that another bright planet could also be at that time in Leo.

In the middle row, right above Leo and the *secondary* Virgo, there is a plate with a self-entwined snake — a symbol of the autumn equinox. A little further to the right, between Leo and Cancer, there is a male figure (the size of the step is too long for a female figure) of a warrior holding a raised sword in one hand and some arrows in another. This is most likely a representation of Mars. Since the location of this planet is in the same distance from Virgo as from Gemini, this planet could also belong to the partial horoscope of the summer solstice. There are no other planetary symbols from partial horoscopes in this fragment of the zodiac.

In the bottom row, right under the figures of Leo and the *secondary* Virgo, there is a boat with a male standing in between two female figures, holding their hands. The most probably, this is a symbolic representation of a meeting between Venus and another "male" planet, or even with the Sun. In the last case, this scene wouldn't give us any sufficient information that could be useful in the verification process of solutions, because it is already known that in this astronomical situation Venus was close to the Sun. In fact, such scenes of meetings on the Egyptian zodiacs, may only be supplementary without any relation to the partial horoscopes. This was the reason for marking these three figures on the color annotated zodiac (see Figure 7.42) partially in light blue and green.

Now, we are in a position to conclude that in the preserved part of the Small zodiac only the presence of Venus and Mercury in the partial horoscope of the autumn equinox can be for sure recognized. The figure of Mars, which is located in between Cancer and Leo, may or may not be related to this partial horoscope, because it could very well belong to the partial horoscope of the summer solstice. However, on the day of the autumn equinox, there was a bright planet in Leo. The fragment of the Small zodiac with Virgo and Libra was destroyed and it is possible that it contained additional information about other planets in the proximity of the Sun on that day.

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[B] **Partial Horoscope of the Winter Solstice**: This partial horoscope is located in Sagittarius and in the neighboring constellations of Capricorn and Scorpio. The fragment of the Small zodiac with the constellation of Scorpio did not survived. However, the constellations of Sagittarius and Capricorn were preserved. In addition, in the upper row, the area of the Small zodiac, which is devoted to the partial horoscope of the winter solstice, is exceptionally large. All the other remaining partial horoscopes in the upper row occupy much less space than this one, and the size of their symbols is also smaller (see Figures 7.41 and 7.42).

In the upper row, around the symbol of the winter solstice — a cobra with upright body standing on a podium, there are three walking figures holding planetary walking sticks. In the case of the first figure standing at the right end of the preserved part of the zodiac, we can guess by the gesture of its hand that it is holding something — possibly a walking stick. We have no idea what was displayed on the destroyed fragment of the zodiac, but it is possible that it contained other figures with walking sticks. The three walking figures are accompanied by sitting figures also holding planetary walking sticks. There are also several figures representing fantastic creatures like snakes with legs and arms or snakes standing in vertical position on their tails. All together, this conglomerate of figures in the upper row resembles the symbolism of the main horoscope on the Big Esna zodiac. The experience that we acquired by analyzing the Big zodiac, can now be used to decode the meaning of this partial horoscope. Let us point out that all these figures are located in the upper row of the Small zodiac, which is clearly separated by a double horizontal line from the area of the zodiac containing the main horoscope.

Using the already decoded Big Esna zodiac, we can now attempt to understand the meaning of this scene in the upper row. It is not too complicated.

Let us begin with the last figure located on the right inside the preserved part of the zodiac. Behind this male figure there is a small animal sitting at its feet. On the Big zodiac, we have seen such small animals accompanying a walking male figure, which was identified as Mercury (see the color annotated Big Esna zodiac on Figure 7.33, where this figure is located on the right from Aquarius). By comparing the symbols on the both Esna zodiacs, it becomes clear that we are dealing here with Mercury.

There are three sitting on chairs figures in the upper row occupied by the winter solstice partial horoscope. Each of them holds a planetary walking stick. Except possibly of the sitting figure on the left, it is easy to distinguish in their postures shapes of female breast. Notice that one of the hands holding the stick covers the view of the breast of that figure (see Figure 7.41 and 7.42). In this way, we can identify these figures, with possibly one exception, as female. Consequently, they represent Venus, or in the case one of them is male — also Mercury (see subsection **??**). Mercury however, as we noticed earlier, is located at the right end of the preserved part of the zodiac, where it is accompanied by its typical attribute — a vertical snake. In addition, the last walking figure in this sequence, located right behind the sitting figure of unclear gender, has a lion head. This is an attribute of Venus. Let us point out that similar figures accompanied Venus on the Big Esna zodiac and on the Long Denderah zodiac as well. On the Big zodiac, a very similar figure with lion head, also standing behind a sitting female figure, was identified as a representation of Jupiter. Therefore, all three sitting figures are indeed females, and most likely all of them represent Venus, while the figure holding a planetary walking stick, is Jupiter. Indeed, on the Big zodiac Jupiter in the main horoscope was shown by a very similar loin-headed figure following Venus.

Let us analyze the middle and lower rows in this area of the Small zodiac.

In the middle row, between the figures of Capricorn and Sagittarius, there is a symbol of the spring equinox. It is represented by two figures standing on a snake. There is no contradiction here — the snake is a *pull-out* symbol (see section 5.6) indicating that this is not the correct location for the spring equinox. The right place for it should be in Pisces. The meaning of this significant shifting to the right is rather clear. It probably indicates that the area of the spring equinox extends almost to Sagittarius. The *pull-out* symbol signals that the spring equinox penetrated to that location, which is usually occupied by the winter solstice. Consequently, the winter solstice was completely pushed out from the middle row in this area. We still should remember that the destroyed fragment of the zodiac could contain other elements of the partial horoscope of the winter solstice.

Let us look now at the boom row. Notice that there are no symbols of the the partial horoscopes in that area (see Figure 7.42).

Let us summarize our decoding of the partial horoscope of the winter solstice: Mercury, Venus and another planet, the most probably Jupiter, were at that time located in Sagittarius or not far from it. There could be one or more planets located in Scorpio or between Scorpio and Sagittarius, but this information is not available because of the damage to the Small zodiac.

[C] **Partial Horoscope of the Spring Equinox and the Supplementary Scene between Aquarius and Capricorn**: Let us recall that on the Egyptian zodiacs, the Sun on the day of the spring equinox was shown in Pisces (see subsection 5.8.3). So, the region of the partial horoscope of the spring equinox was usually spread between the adjacent to Pisces constellations of Aries and Aquarius. However, in the middle row on the Small zo-

diac, the area of this partial horoscope is extended up to the figure of Sagittarius (see Figures 7.41 and 7.42).

We begin with the upper row in that fragment of the zodiac. Notice the symbol of the spring equinox — a figure sitting on a podium marked with a diagonal cross. It is located right above Pisces. Around that symbol we find the figures of the minimal partial horoscope, i.e. Mercury and Venus (see Figure 7.42). Of course, Venus and Mercury always appear near the proximity of the Sun, so this information has no real value for the verification of admissible solutions.

In the middle row of this area of the zodiac we find many figures belonging to the partial horoscope. Between the symbols of Pisces and Aquarius there is a male figure. It has two faces and holds a snake. These attributes are typical for Mercury (see subsections 5.4.9 and 5.4.10). It is an indication that Mercury on the spring equinox day was located either in Pisces or in Aquarius.

In between the symbols of Aquarius and Sagittarius, there is shown a gathering of planetary figures standing on boats or snakes. There are exactly six such figures in this location. On the color annotated zodiac (see Figure 7.42), all these figures are marked in green, because most probably they indicate a supplementary astronomical scene. In fact, there are too many planetary symbols for just one partial horoscope. On the other hand, and this is important, all the planetary symbols from the partial horoscopes are shown in the middle row without *pull-out* attributes. Since the planets of the main horoscope are shown in the bottom row, there is no need for using special symbols to distinguish them form the planetary symbols of the partial horoscopes. The same arrangement was also used in the case of the Big Esna zodiac. Nevertheless, all the figures in this astronomical scene (except one small male figure located under the left end of Capricorn) are placed on *pull-out* symbols of snakes or boats.

In the upper part of this scene, we see three figures placed on a long snake. The fist one is a walking male figure with jackal's head, followed by another male figure with a disc replacing its head, and the last figure is shown in a sitting position. It is possible that this is a symbolic representation of a half-revolution of Mercury around the Sun. Indeed, it could symbolize Mercury that was visible, then when it disappeared behind the Sun, and finally when it came to rest (the sitting position), before it begins to move backward towards the Sun. This is exactly how the real motion of Mercury appears on the sky.

Under the snake, there is a large male figure in a horizontal position. It is also standing on a snake. On its right, there is a small female figure on a boat — probably a representation of Venus. Further to the right and slightly down, there is a male figure with cat's or lion's head. It walks in the opposite to the other figure direction (i.e. to the left). We can conclude, that in this supplementary scene, three other planets were also involved, among them Venus.

In summary, in this supplementary scene, there are shown four planets, among them Venus and Mercury. Since this configuration of planets is located between Aquarius and Capricorn, the Sun at that time was either in Aquarius or Capricorn. That means, this astronomical event took place in January or February. Let us point out that this scene appears next to the symbol of Aquarius, right above the aquarian bracket in the bottom row. As we conjectured it earlier (see subsection 5.1.11), the symbol of Aquarius was probably a representation of John the Baptist. Let us notice that on January 6, according to Julian calendar, the Christian Church celebrates Epiphany, which is one of its oldest festival commemorating Baptism of Jesus Christ. It is interesting to check if on this particular day, indicated by the astronomical solution, there were indeed four planets in the proximity of the Sun. In our check-up list we will reserve a spacial place for this supplementary scene.

Let us return to the partial horoscope of the spring equinox. In the middle row there is only one figure left about which we didn't comment anything yet. It is a male figure holding a stick with a high ornament on his head. Clearly, it indicates one more planet of the partial horoscope which was either located between Capricorn and Sagittarius.

In the bottom row there are no symbols of partial horoscopes.

In this way we have obtained the following decoding of the partial horoscope of the spring equinox: Mercury, which was in Pisces or Aquarius, Venus, and one more planet located in Capricorn.

[D] **Partial Horoscope of the Summer Solstice**: The Sun on the summer solstice day was usually shown on the Egyptian zodiacs in Gemini (see subsection 5.8.4). On the Small zodiac, the symbol of the summer solstice is located in the upper row above Gemini. It is a figure of a cobra with upright fore body, standing on a podium (see Figure 7.42) located in between two sitting female figures (the shapes of female breast can be easily distinguished). The female figure on the left holds a typical planetary walking stick. The other sitting female figure, the one on the right from the summer solstice symbol, holds in her hand an object resembling a loop in a shape of an eye. There are three wavy lines marked across this object. It is clear that it is a representation of Venus.

A little further to the right, there is an accumulation of snakes, snakes with wings and a bird. Similar symbols were also present in the summer solstice area on the Big zodiac (on the left from Gemini). Among those symbols we are able to recognize only one planetary symbol. It is a two-headed snake representing Mercury. In this way, in

the upper row of the summer solstice area on the Small zodiac, there is only a minimal partial horoscope composed of Venus and Mercury. There are no other planets indicated there.

In the middle row, there is a typical for the Egyptian zodiacs symbol of the summer solstice — a man with a raised hand standing on a boat (see subsection 5.8.4, where we discussed this symbol on the Small Esna zodiac). Right next to it, there is a two-headed animal and a crocodile. These are again the symbols of the minimal partial horoscope: Mercury and Venus near the summer solstice point. On the left from Cancer, there is a figure of a warrior. It holds a raised sword in one hand and arrows in another. It is definitely a representation of Mars, but it is not completely clear to which partial horoscope it belongs: the one of the summer solstice or the autumn equinox.

In the bottom row, on the right from Gemini, there is a familiar symbol of the summer solstice — a boat with a bull and a female figure. Notice a small arrow over the bull's head. Even though the female holds no bow, we still can think that the arrows come from her (see subsection 5.8.4). Furthermore, right behind the "Gemini Brackets," there is a pair of male travelers standing on a boat. An almost identical pair of two male figures with hawk faces, which is a planetary symbol in the main horoscope, is following it. One can assume that the pair on the boat — a *pull-out* symbol, represents the same planet in the partial horoscope (see section 5.6). As it turned out, this planet was identified in the obtained complete solution as Mars. We will see later, when we will be checking out this solution, that Mars in the partial horoscope of the summer solstice was indeed in Gemini. This identification agrees with the symbol of the warrior with a raised sword located between Leo and Cancer in the middle row. If this figure indeed represents Mars in the partial horoscope of the summer solstice, then Mars could be located on the boundary between Gemini and Cancer.

In this way we have obtained the following decoding of the partial horoscope of the summer solstice: besides the minimal horoscope composed of Venus and Mercury, there was also Mars in the surroundings of Gemini. Mars was either located in Gemini, or, in the case the symbol of the warrior belongs to this partial horoscope, on the boundary between Gemini and Cancer.

7.6.5 Final Solution for the Small Esna Zodiac: May 6—8, 1404 AD.

A complete solution that was found for the Small Esna zodiac turned out to be unique. It was May 6–8, 1404 A.D., exactly 10 years after the date indicated on the Big Esna zodiac! During that time the configuration of the planets on the sky was as follows:

SUN – in Taurus;

MOON – in Aries, appearing as a shrinking moon crescent;

MARS – in Gemini;

VENUS – in Taurus, near its border with Gemini;

MERCURY – in Taurus, near its border with Aries;

SATURN – in Aquarius;.

JUPITER – in Capricorn.

It is clear that these locations perfectly fit the planetary data contained in the main horoscope (see subsection 7.6.3). In Appendix **??**, we include the input date that was used to find this solution.

Julian day (JD) = 2233995.00 Year/Month/Day = 1404/5/6						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
1.29 Taurus	11.95 Pis/Ari	10.13 Aquarius	9.81 Capricorn	2.28 Gemini	1.88 Taurus	1.16 Taurus
Julian day (JD) = 2233996.00 Year/Month/Day= 1404/5/7						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
63.4^o 1.31 Taurus	238.5^o 0.48 Aries	331.7^o 10.13 Aquarius	324.4^o 9.82 Capricorn	98.2^o 2.30 Gemini	86.4^o 1.92 Taurus	57.3^o 1.15 Taurus
Julian day (JD) = 2233997.00 Year/Month/Day= 1404/5/8						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
64.3^o 1.34 Taurus	52.4^o 1.02 Aries	331.8^o 10.13 Aquarius	324.5^o 9.82 Capricorn	98.9^o 2.32 Gemini	87.6^o 1.95 Taurus	56.8^o 1.14 Taurus

Table 7.16: *Planetary Positions in the Period May 6–8, 1404*

On Figure 7.43, we show the final decoding of the Small zodiac, corresponding the computed complete solution. In Table 7.16, we list the planetary positions on the main date: May 6–8, 1404 AD. As usual, we indicate the locations of planets in degree on the ecliptic J2000, as well as by using the coordinates on the constellation scale (see section 6.10).

The planetary configuration that fits in the best way the astronomical data shown on the Small zodiac, occured on May 7, 1404. On that day, Moon in a shape of a shrinking narrow crescent was located in Aries. At that time, the mean distance from the best points was only 8^o, which can be compared with a quarter of the length of an average zodiac constellation. Since even the mean discrepancy from the best points of magnitude 15^o can be considered as acceptable (see section 6.11), this result should be considered as very good.

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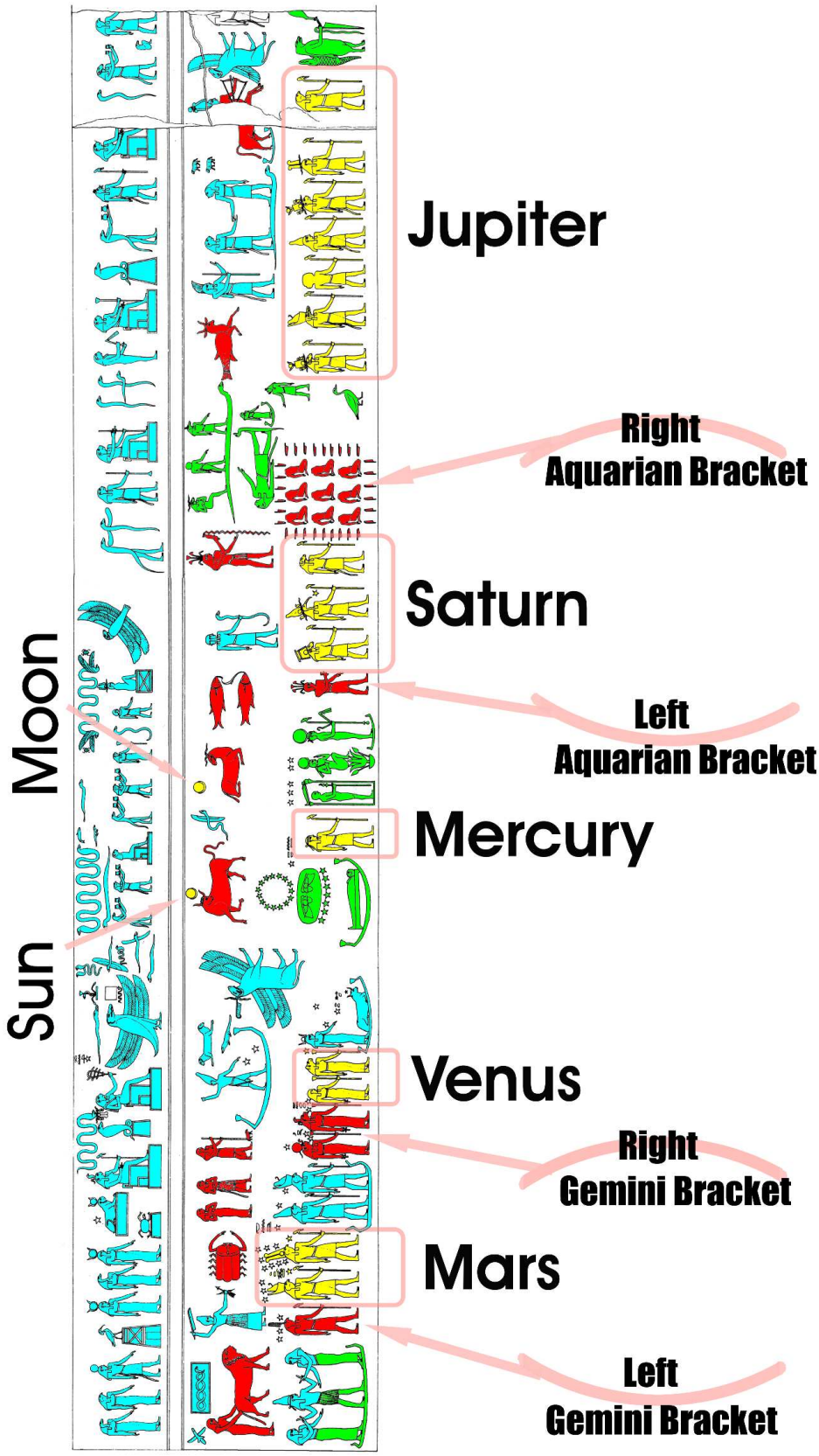

Figure 7.43: *Final decoding of the Small Esna zodiac, which led to a unique full solution.*

7.6.6 Checkup list for the Small Esna Zodiac Final Solution

In this subsection we will discuss the verification process applied to the final solution for the Small Esna zodiac, which was May 6–8, 1404. We will compare the real astronomical pictures occuring on these dates with the situation shown on the Small zodiac. In particular, we are interested in the presence of the visibility attributes and the information included in partial horoscopes. On Figure 7.44, we show the complete check-up list for the final solution. Let us recall that we call a solution *complete* or *full*, if we are able to confirm the full agreement between the solution and all the astronomical information decoded from the zodiac. On Figure 7.44, we used the sign *plus* to confirm good correspondence between the solution and the specific items from the check-up list (see section 6.14).

In regards to the visibility of planets, we need to make verifications only for Mercury, Venus and Mars. Only those planets could turned out to be invisible because of their proximity to the Sun. The visibility attributes were not sometimes even marked on the Egyptian zodiacs for those planets which were located far away from the Sun.

Column 1: VISIBILITY OF PLANETS. Let us discuss first the visibility of Venus. According to its representation on the Small zodiac, Venus should be visible on the main date, and indeed, it was located in very good evening visibility position. At the moment Venus was disappearing behind the horizon on May 7, 1404, the submersion of the Sun was SUH= 20^o, i.e. Venus was descending already in a complete darkness. In addition, the brightness of Venus was also very high $M = -3.5$. Regarding the visibility of Mercury, its attributes on the Small zodiac indicate that it shouldn't be visible on May 7, 1404. On that day, Mercury raised in Cairo when the submersion of the Sun was only SUH= 2^o, and its brightness was also very low — only $M = +3.6$, which can be compared with the brightness of faint stars. It is clear that in such situation Mercury could not be visible neither in Cairo nor Luxor. The Mars attributes on the Small zodiac indicate that it was visible. This fact can be also confirmed in the case of our solution. On the main date, Mars was located in Gemini, not far from Venus — only 10^o further from Venus. Its brightness was rather high $M = +1.8$, which can be compared with the brightness of the second magnitude stars. In the evening on May 7, 1404, at the moment Mars descended on the horizon, the submersion of the Sun was $SUH = 30^o$, which simply means that it was already night. Therefore, **Mars was clearly visible** at that time. In this way, we obtain that the visibility information included on the Small zodiac is confirmed by our solution, and consequently we annotate the first column with the plus sign to show that these conditions are satisfied.

Column 2: PARTIAL HOROSCOPE OF THE AUTUMN EQUINOX. As in the case of other zodiacs, we consider the variant of the year beginning in September, i.e. the year of our solution started in September 1403 and ended in August 1404. The exact date of the autumn equinox in that year was on September 10, 1403. Since even during the Middle Ages the computations of the exact autumn equinox date were not at all accurate, we should admit a possibility for an error of 5-6 days. Let us indicate the positions of the planets on the ecliptic on September 10, 1403 (see Table 7.17).

Julian day (JD) = 2233756.00 **Year/Month/Day = 1403/9/10**						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
183.7^o 5.22	114.8^o 2.87	313.9^o 9.44	281.2^o 8.42	319.2^o 9.63	148.5^o 4.16	1204.2^o 5.72
Virgo	Gemini	Capricorn	Sagittar	Capricorn	Leo	Virgo

Table 7.17: *Planetary Positions on September 10, 1403*

In the first row,under the names of the planets, we indicated in degrees the positions of the planets on the ecliptic J2000. In the next row, the locations of the planets are expressed using their coordinates on the constellation scale (see section 6.10). Notice that, according to Table 7.17, the Sun was in Virgo, in its proximity were only Venus and Mercury. All other planets were far away from the Sun.

Let us recall the autumn equinox horoscope on the Small zodiac. On the preserved part of the Small zodiac that is related to the autumn equinox area, one can recognize only Mercury and Venus. The representation of Mars, which is located between Cancer and Leo could be related to this partial horoscope, but it could also be a part of the partial horoscope of the summer solstice. In Leo, on the autumn equinox day, there was indicated a certain bright star. The portion of the partial horoscope related to Virgo and Pisces was destroyed.

Let us observe that on the day of the autumn equinox, on September 10, 1403, Venus was in Virgo. It was the brightest celestial object on the sky at that time. In order to solve the question related to Mars, we need to verify (see below) that on the day of the summer solstice Mars was in Cancer, or not far from it (what is in fact the case). Besides that, we have a full agreement between our solution and the partial horoscope of the autumn equinox on the Small zodiac. So, we also placed the sign plus in this column to indicate that the required here conditions are satisfied.

Column 3: PARTIAL HOROSCOPE OF THE WINTER SOLSTICE. In the year indicated by the solution the winter solstice took place on December 10, 1403 (see Appendix **??**). As usual we admit a possibility of an error — 5–6 days. At that time the Sun was in Sagittarius, where was also located Mercury and Jupiter — the both planets were visible in the evening. Venus was located on the other side of the Sun, in Aquarius. It was visible in the morning. Moreover, Saturn was in the next to Sagittarius constellation of Scorpio — just 5^o from its border. Its distance from the Sun was rather large

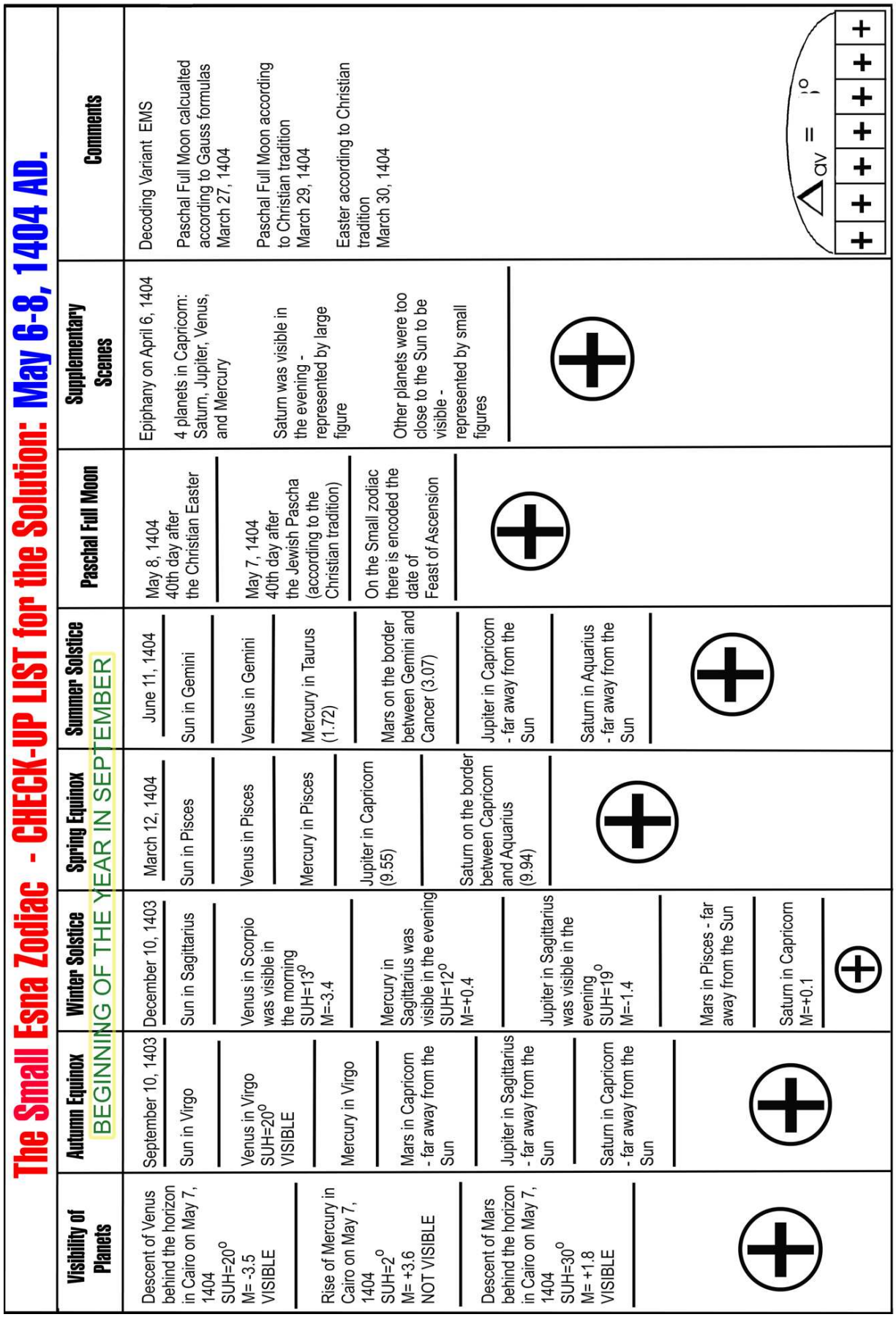

Figure 7.44: *Check-Up List for the final solution for the Small Esna Zodiac: May 6–8, 1404 AD.*

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— about 42^o. Jupiter and Mercury, which were located on the same side of the Sun, were much closer to the Sun — Jupiter was 21^o and Mercury was 15^o from the Sun along the ecliptic. The closest to the Sun was Venus — just about 14^o from the Sun. All the other planets were even much further from the Sun than Saturn. Consequently, on December 10, 1403, in the proximity of the Sun there were three planets: Venus, Mercury and Jupiter (see Table 7.18).

Julian day (JD) = 2233756.00 Year/Month/Day = 1403/12/10						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
275.1^o 8.25	224.5^o 6.43	317.3^o 9.56	296.2^o 8.85	362.2^o 11.39	261.2^o 7.82	290.9^o 8.69
Sagitta	Pisces	Capric	Sagitta	Pisces	Scorpio	Sagitta

Table 7.18: *Planetary Positions on December 10, 1403*

Let us recall the decoding of the horoscope of the winter solstice on the Small zodiac. In this partial horoscope, besides the Sun, we have recognized in Sagittarius Mercury, Venus, and one more planet — the most probably Jupiter. Moreover, some other planets could also be located in Scorpio, or even in Sagittarius from the Scorpio side, but unfortunately this part of the zodiac was damaged. Notice that this information fully agrees with the computed solution. Again we annotate this column with a sign plus, to signal that the required conditions are satisfied.

Column 4: PARTIAL HOROSCOPE OF THE SPRING EQUINOX. In the year of our solution, the spring equinox occured on March 12, 1404 (see Appendix **??**). As usual, we allow 5-6 days as the margin of error. Let us describe the positions of the planets on the ecliptic on March 12m 1404 (see Table 7.19).

Julian day (JD) = 2233940.00 Year/Month/Day = 1404/3/12						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
368.9^o 11.56	380.8^o 311.86	327.9^o 9.94	317.0^o 9.95	62.4^o 1.28	377.6^o 11.78	365.7^o 11.48
Pisces	Pisces	Cap/Aqua	Capric	Taurus	Pisces	Pisces

Table 7.19: *Planetary Positions on March 12, 1404*

On that day of the spring equinox, the Sun was in Pisces. In Pisces there were also Venus and Mercury. Moon was also in Pisces, but on the Small zodiac Moon was shown on the partial horoscopes

Let us now compare these locations with the situation shown on the partial horoscope of the spring equinox on the Small Esna zodiac. Besides Mercury and Venus there was one more planet either in Capricorn or on its border with Sagittarius. The location of Mercury was either in Pisces or in Aquarius. Our solution agrees well with this partial horoscope. Indeed, Mercury on March 12, 1404 was in Pisces — as it is indicated on the Small zodiac. On that day, in Capricorn, there was a very bright planet — Jupiter. Around the Sun there were no other planets except Mercury and Venus. However, it is somehow strange that Saturn is missing from this partial horoscope, while Jupiter, that was also quite far from Pisces, is present there. One can guess from the design of the Small zodiac that its author, for some unknown to us reasons, decided to extend this partial horoscope by one planet located in Capricorn. In our solution, this planet is Jupiter. Notice that besides that planetary figure, the author of the zodiac included, in the area between Capricorn and Sagittarius, also the symbol of the spring equinox placed on a snake — a *pull-out* symbol. We do not know what was the exact idea behind this design, which is very unusual for the Egyptian zodiacs. Maybe, Saturn is missing from this partial horoscope because it was already too far from Pisces, so there is no reason to consider this detail as significant. Consequently, we can confirm that our solution agrees with required here conditions, and we can annotate the column 4 with the plus sign.

Column 5: PARTIAL HOROSCOPE OF THE SUMMER SOLSTICE. In the year 1404, the summer solstice occurred on June 11 (see Appendix **??**). In Table 7.20 we list the planetary positions on the ecliptic on the summer solstice day on June 11, 1404.

Julian day (JD) = 2234031.0 Year/Month/Day = 1404/6/11						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
96.8^o 2.25	137.6^o 3.76	331.8^o 10.13	324.7^o 9.83	120.4^o 3.07	128.6^o 3.40	78.8^o 1.72
Gemini	Cancer	Aquar	Capric	Can/Gemi	Gemini	Taurus

Table 7.20: *Planetary Positions on June 11, 1404*

The Sun was in Gemini, accompanied, as usual, by Venus in Gemini and Mercury in Taurus. Moreover, Mars was located on the border between Gemini and Cancer. There were no other planets around this area. We do not consider Moon, because on the Small zodiac it was not included in the partial horoscopes.

Let as recall the partial horoscope of the summer solstice represented on the Small zodiac. Besides the minimal horoscope, composed of Venus and Mercury, around Gemini is also shown Mars. It was located either in Gemini or between

Cancer and Gemini. The second possibility would occur if the warrior with raised sword located ext to Cancer was also representing Mars. We should, however, remember that this figure of the warrior was excluded from the partial horoscope of the autumn equinox for our solution. That gives us another reason to include it in the partial horoscope of the summer solstice. In this way, Mars in this partial horoscope is shown on the border between Gemini and Cancer. Consequently, we get a perfect match and we can annotate this column with the plus sign.

Column 6: SYMBOLIC DESCRIPTION OF THE PASCHAL FULL MOON. On the Small Esna zodiac a special attention is devoted to the Paschal Full Moon and the festival of Pascha. We have already discussed this topic in subsection 5.9.1. Let us point out that on the Small zodiac the festival of Pascha is shown as a celebration of the Resurrection, exactly in the Christian tradition.

The festival of Pascha takes place in the spring when the Sun is in Aries or closed to it. The symbolic description of the Paschal Full Moon on the Small zodiac is located in its bottom row, under the figures of Aries and Taurus. On the color annotated zodiac (see Figure 7.42) these symbols are marked in green. They include: 1) appearance of the new Paschal Moon, 2) occurrence of the full Paschal Moon on the 15th day, 3) the symbol of dead Osiris — the Egyptian Christ, in this grave, before the resurrection, and finally, 4) the symbol of the seven day celebration of its resurrection. All these symbols were already discussed in subsection 5.9.1.

The first astronomical spring full moon in 1404, which can be computed using the Gauss' formulas, occured on March 27. However, the paschal moon, according to the calculations of the Easter date, which not necessarily coincide with the astronomical full moon, occured on March 29. On this day, according to the Christian Easter tradition, there was also Jewish Pascha. The Christian Easter in 1404 was celebrated on March 30. That means, May 8, 1404, which is the date indicated by our solution, was exactly 40 days after Easter, and May 7, 1404, which is also the date of our solution, was 40 days after Jewish Pascha (according to the Christian tradition). Let us point out that the Orthodox church celebrates the Feast of Ascension, exactly 40 days after Easter. Consequently, the date commemorated on the Small zodiac turns out to be the date of the Feast of Ascension in 1404. This could be probably the reason why on this zodiac there is so much place devoted to the festival of Pascha. In this way, we are able confirm that our final solution fits well the symbolic description of the Pascha on the Small zodiac, so we can annotate the sixth column by the sign plus.

In this way, we are getting additional reasons to suspect that the supplementary scene with four planets, which is located in the middle row in Capricorn, is related to one of the principal Christian festival — Epiphany, which commemorates the Baptism of Jesus Christ. Let us point out that Epiphany, according to the Julian calendar is celebrated on January 6th, when the Sun is in Capricorn. On the other hand, as we've already mentioned it earlier, the symbol of Aquarius standing next to Capricorn, probably symbolizes John the Baptist on the Egyptian zodiacs. Epiphany is a festival dedicated to John the Baptist who baptized Jesus Christ.

Let us look closely what was happening in Capricorn on January 6, 1404, on the day of celebration of Epiphany. Were there located four planets on that day? It turns out that yes, they were!

Column 7: SUPPLEMENTARY SCENE BETWEEN AQUARIUS AND CAPRICORN. The chart of the sky observed from Cairo on January 6, 1404 is shown on Figure 7.45. We can see that on that day there were indeed four planets in Capricorn: Saturn, Venus, Mercury and Jupiter. All the other planets were far away from Capricorn — Mars was in Pisces and Moon in Virgo. Moreover, among these four planets only Saturn was well visible in the evening on January 6th. At the moment Saturn descended on the horizon, the Sun was submerged behind the horizon about 16^o, i.e. it was almost complete darkness at that time. When the Sun is 18^o behind the horizon, we can consider it as the beginning of the night. Let us point out that the brightest stars are already visible when the Sun is submerged only 6^o. The brightness of Saturn on January 6, 1404 was $M = +1.1$, which can be compared to the brightness of stars of the first magnitude. Therefore, Saturn was very well visible on this day.

The remaining planets in Capricorn — Mercury, Jupiter and Venus — were not visible, because of their proximity to the Sun (see Figure 7.45). Jupiter almost coincided with the Sun. Mercury, which was located close to the Sun, had on that day very low brightness — $M = +3.4$. Consequently, we have to exclude the visibility of Jupiter and Mercury. Actually Venus could be visible for a very short moment, in the morning on January 6, just before the sunrise. Venus was rising in Cairo, when the Sun was submerged behind the horizon only 6^o. At that moment the sky was becoming illuminated by the raising Sun and even the brightest stars were already invisible. Venus with its very high brightness $M = -3.4$ could be visible, but only for a very short time.

This situation agrees well with the supplementary scene shown between Aquarius and Capricorn. In this scene on "snakes and boats" the three planets, including the groups of Mercury and Venus, are shown as small figures. The forth planet has significantly larger size. Since in our solution, the three planets disappeared in the rays of the Sun, while the forth one — Saturn, was well visible, we can confirm that this solution agrees well with the supplementary scene on the Small zodiac.

The exact locations of the planets on the ecliptic on January 5–7, 1404, are shown in Table 7.21. We consider here two additional days before and after the day of Epiphany, to find out what were the movements of the planets on the sky on that day.

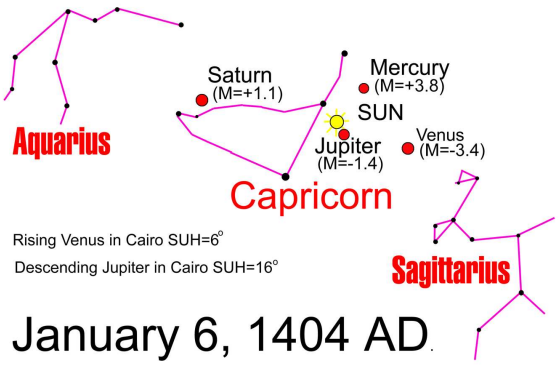


Figure 7.45: *A drawing showing the planetary locations near the Sun on January 6, 1404 — the day of Epiphany.*

Julian day (JD) = 2233873.00 Year/Month/Day = 1404/1/5						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
301.6^o 9.00	206.9^o 5.79	320.2^o 9.66	302.2^o 9.02	378.9^o 11.81	293.9^o 8.78	303.0^o 9.05
Capric	Virgo	Capric	Capric	Pisces	Sagitt	Capric
Julian day (JD) = 2233874.00 (EPIPHANY) Year/Month/Day = 1404/1/6						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
302.7^o 9.04	219.6^o 6.19	320.3^o 9.67	302.5^o 9.03	379.5^o 11.82	295.1^o 8.82	301.8^o 9.01
Capric	Pisces	Capric	Capric	Pisces	Sag/Capr	Capric
Julian day (JD) = 2233875.00 Year/Month/Day = 1404/1/7						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
303.7^o 9.08	232.7^o 6.81	320.4^o 9.67	302.7^o 9.04	380.2^o 11.84	296.4^o 8.85	300.5^o 8.97
Capric	Pisces	Capric	Capric	Pisces	Sag/Capr	Capric

Table 7.21: *Planetary Positions in the Period January 5– 7, 1404.*

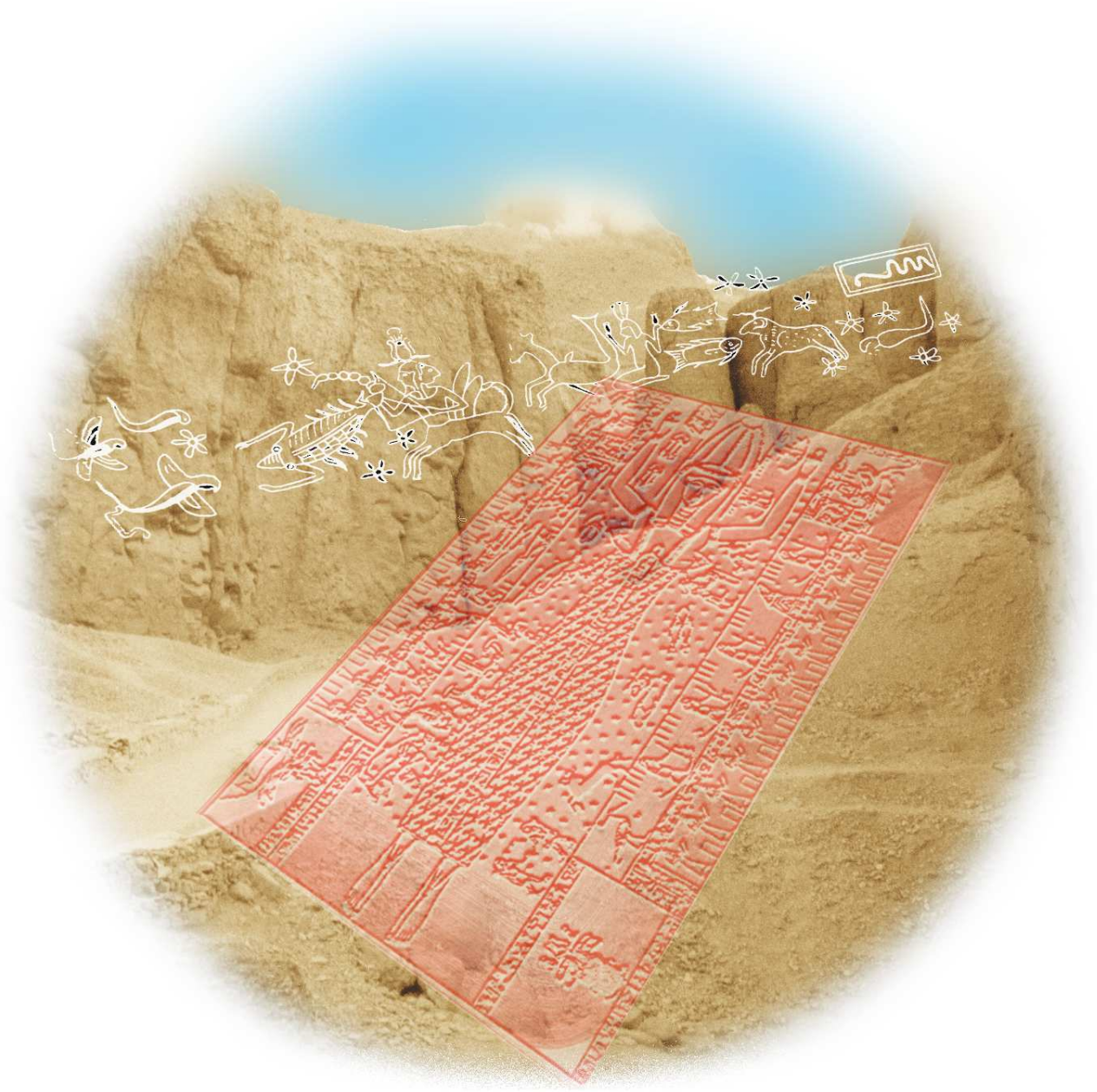
In this way we can annotate the seventh column with the sign plus to indicate the full agreement with the supplementary scene.

In this way we concluded the verification of our checkup list for the Small Esna Zodiac Final Solution, and we can confirm that in all columns there are only plus signs, so this **solution is complete**. No other complete solutions, using all possible variants of decoding, were found.

CONCLUSION: The Small Esna zodiac represents the date May 6–8, 1404 AD. It was the Feast of Ascension. The best correspondence with the Small zodiac was achieved on May 7, 1404.

Chapter 8

The Dates Shown on the Zodiacs form Ancient Egyptian Tombs and Sarcophagi



8.1 The Athribis Zodiacs of Flinders Petrie

8.1.1 Decoding of the Main Horoscopes: Six Variants for Identification of Planets

In Chapter 2 (see section 3.3), we have already discussed the Athribis zodiacs and the previous attempts of their astronomical dating. Drawings of these zodiacs are shown on Figure 2.19 (see also Figure 3.9). Let us recall that the Athribis zodiacs were painted on a ceiling of an ancient Egyptian burial cave. These two zodiacs were located one beside the other. They were discovered in 1901, near the city Athribis in Upper Egypt (not far from Sohag), by the famous Egyptologist W. Flinders Petrie[1]. Let us point out that inside the city of Athribis there was an ancient temple of a similar type to the temples in Denderah[2]. We should not exclude such a possibility that a zodiac could also be placed in this temple. Unfortunately, we were unable to find any detailed description of this temple. If there was indeed a zodiac inside the Athribis temple, it could be extremely interesting to decode its date and compare it with the dates on the other two Athribis zodiacs.

Since the two Athribis zodiacs were found in a burial cave, their dates are most likely related to the occupants buried in this tomb. In the 19th and 20th centuries there were two attempts of the astronomical dating of these zodiacs, undertaken by Knobel and Morozov. In section 3.3, we have discussed the flaws and mistakes in Knobel's and Morozov's decodings. In particular, we have demonstrated that their decodings couldn't be correct because the same symbols on the upper and lower zodiacs were identified as different planets. For these reasons, we have to start the identification process right from the beginning. Nevertheless, our final decoding turned out to be very close to the one that was initially proposed by Flinders Petrie.

On Figures 8.1 and 8.2, we present a detailed reproduction of the Flinders Petrie drawings of the Athribis zodiacs. The color annotated Athribis zodiacs are shown on Figures 8.3 and 8.4.

Let us now analyze the symbolism of these two zodiacs: the symbols of zodiacal constellations, planetary figures and elements on the partial horoscopes.

Zodiacal Constellations on the Athribis zodiacs are easy to identify. They are arranged in the sequence of usual symbols in the correct order. All the individual zodiacal symbols on the Athribis zodiacs were already discussed in section 5.1 (see Figures 5.1, 5.3, 5.4, 5.6, 5.10, 5.11, 5.13—5.16, 5.18, 5.19). Let us point out that on the Athribis zodiacs, the female figure holding the Leo's tail is the main representation of Virgo. Usually, on the Egyptian zodiacs, such a figure represents the secondary Virgo. However, on the Athribis zodiacs there is a single representation of Virgo. On the color annotated zodiacs (see Figures 8.3 and 8.4) the constellation figures are marked in red.

All the **Planetary Symbols** on the Athribis zodiacs, except the Sun, Moon and Mercury, are represented by figures of birds. N.A. Morozov was well aware of this particularity of the Athribis zodiacs. Even before Morozov, this fact was also noticed by Egyptologists. Our analysis confirms the correctness of this identification. The only problem here is how to assign the "roles" to these birds, i.e. exactly what planet is represented by each bird? We will discuss this question, but first let us identify the symbols of the Sun, Moon and Mercury.

SUN: On each of the Athribis zodiacs, there is a disc representing the Sun. On the Upper zodiac, such a disc is located in Taurus. On the Lower zodiac, it is placed under Capricorn and Aquarius.

MOON: On the Lower Athribis zodiac, Moon is shown under Sagittarius. A color picture of this fragment is presented in Figure 3.9. Moon is represented there by a dark-red disc standing on a narrow but quite tangible greenish crescent. Therefore, it is rather straight forward observation that it has to be Moon. Nevertheless, because of this red color of the disc, we have also considered the other variants, where this symbol was the Sun, while the other disc without a crescent, was assumed to be Moon. We did not get even a one pair of solutions for these decodings. Consequently, on the Lower Athribis zodiac Moon is shown in Sagittarius. Notice that on the both Athribis zodiacs there is also another disc in Libra, with a bird inside. This one is not Moon in the main horoscope but a symbol of the Paschal Full Moon. In subsection 5.9.1, we've already explained that this symbol represents Moon reflecting the light of the Sun-bird. On the color fragment of the Lower Athribis zodiac (see Figure 3.9), the disc is red and the bird inside is yellow.

On the Upper zodiac, a crescent representing half Moon is shown under Gemini. It is possible to recognize that this crescent was also accompanied by a disc (see Figure 8.1). Unfortunately, this fragment of the zodiac was partially damaged. Nevertheless, knowing Moon's representation on the Lower zodiac we can guess that a similar symbol was also used on the Upper zodiac. In this way we can conclude that on the Upper zodiac Moon is shown in Gemini.

MERCURY: On the both Athribis zodiacs we can recognize a similar male figure with a planetary walking stick. There are no other figures holding walking sticks, except one figure in the partial horoscope area on the Upper zodiac. On the Upper zodiac, this male figure is located under Taurus, and on the Lower zodiac it is under Pisces. On the Lower zodiac, it is easy to recognize that this figure has two faces, but on the Upper zodiac this fragment was damaged and the head of that figure is missing. We are already familiar with such a male symbol with a planetary walking stick — it is Mercury in the main horoscope (see subsection 5.4.9). Consequently, Mercury on the Upper zodiac is shown in Taurus.

[1] See [4], Vol. 6, p. 731.
[2] See [4], Vol. 6, p. 731.

Figure 8.1: *Flinders Petrie drawing of the Upper Athribis zodiac.*

Figure 8.2: *Flinders Petrie drawing of the Lower Athribis zodiac.*

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Figure 8.3: *Color Annotated Upper Athribis zodiac.*

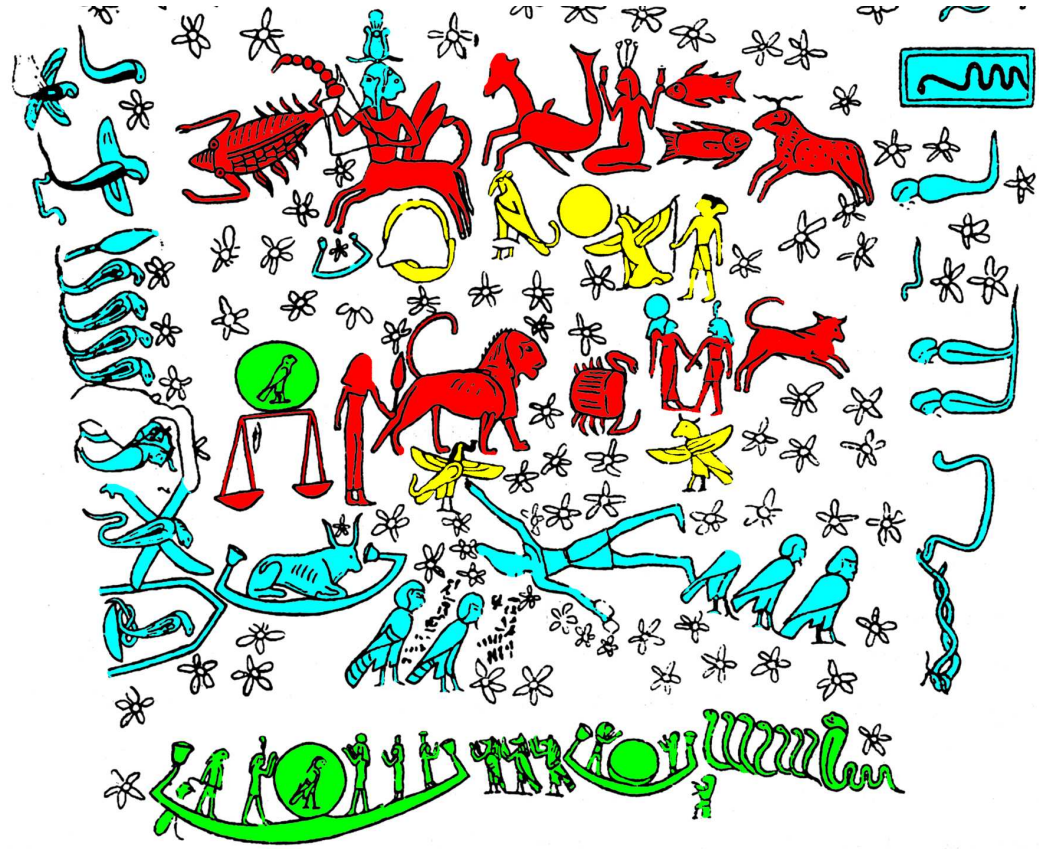

Figure 8.4: *Color Annotated Lower Athribis zodiac.*

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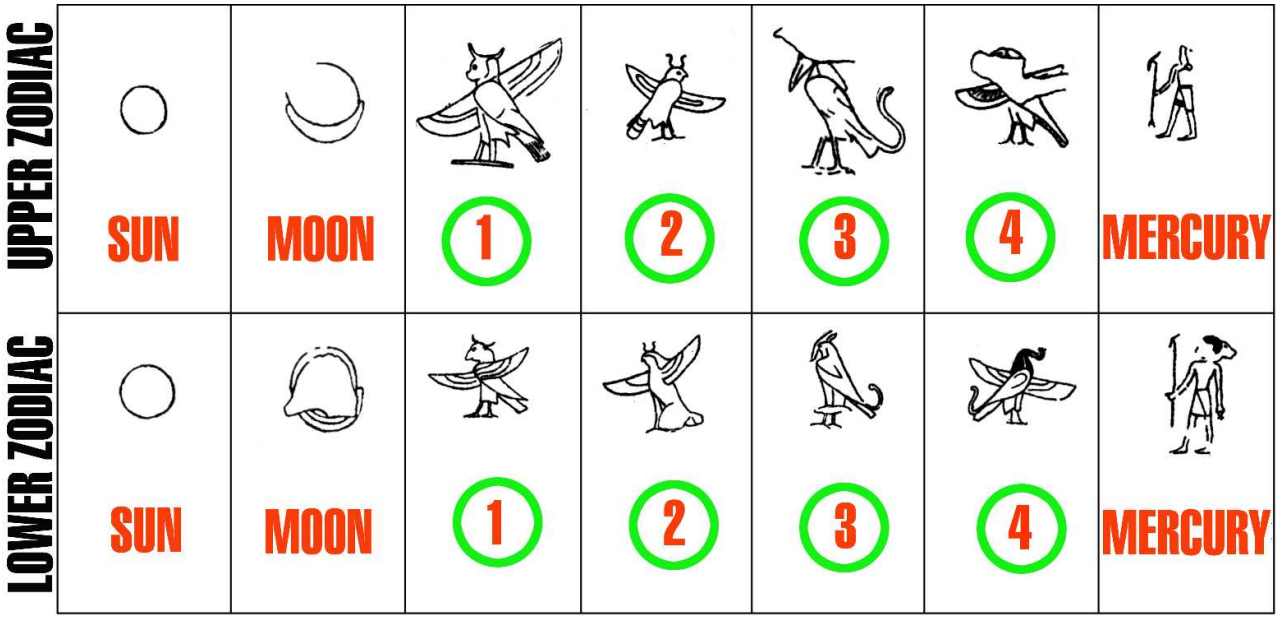

Figure 8.5: *One-to-one correspondence between the planetary symbols on the Upper and Lower Athribis zodiacs.*

On the Lower zodiac, Mercury is most likely shown in Pisces. Let us remark that on that zodiac, Mercury is a part of a group of planetary symbols located under the constellations of Capricorn, Aquarius and Pisces. Thus, it should not be excluded that the whole group was located somewhere among these constellations, so, in such a case, Mercury could be located in a different place than Pisces. Therefore, additional variants with Mercury in Capricorn and Pisces should also be considered. However, in this variant we will simply assume that Mercury was exactly in the constellation under which it is shown on the Lower zodiac, i.e. Mercury was in Pisces. Below, we will also consider the variant with free distribution of these four planets in Capricorn, Aquarius and Pisces.

Now, we have to identify the four remaining planets of the main horoscope: Saturn, Jupiter, Mars and Venus. Notice, that on each of the Athribis zodiacs there are shown exactly four fantastic birds. Some of those birds have horns, snake-like tails, spread wings, etc. It is clear that these four birds represent the four remaining planets of the main horoscope. This fact was already known to Knobel and Morozov, so we are not making any new claim here. However, it turns out that the birds on the Upper and Lower zodiacs have similar features allowing us to establish one-to-one correspondence between them. There is only one way this correspondence can be made (see Figure 8.5).

Indeed:

(1) On the Upper Athribis zodiac, there is a bird shown under Pisces. Exactly the same bird, with horns in a shape of a crescent, is located on the Lower Athribis zodiac under Gemini. There are no other birds with this type of horns on the Athribis zodiacs. Except for the horns, these two birds do not possess any other special features. Clearly, they have the same symbolic meaning, i.e. they symbolize the same planet on the Upper and Lower Athribis zodiacs. Since at this point we still do not know exactly what planet it could be, we will simply call it planet #1.

(2) On the Upper zodiac, right above Cancer, there is a bird with horns pointing sharply up. These horns are also slightly curved at the top, in a similar way to the horns of an antelope, which are spirally twisted. One can find on the Lower zodiac a bird with very similar horns under Aquarius and Pisces. There are no other birds with this type of horns on the Athribis zodiacs. Since there are no other features associated with these birds, this is the only common characteristic, which allows us to identify them as symbols representing the same planet. We will call it planet #2.

(3) On the Upper zodiac, under Capricorn, there is a bird with a snake-like tail, folded wings, and strong sharply pointed beak. A very similar bird is located on the Lower zodiac also under Capricorn. It has curved snake-like tail, folded wings and sharply pointed beak. Notice that there are no other birds with folded wings in the main area of the Athribis zodiacs. Notice that on the Lower zodiac there is a bird with snake-like tail, but its wings are spread and the beak is curved. Therefore, it is definitely a different symbol,. On the other hand, the two birds, which are located on both zodiacs under Capricorn, have all similar characteristics and look exactly alike. Therefore, they represent the same planet. We will call it simply planet #3.

(4) There is exactly one bird left on each of the Athribis zodiacs. On the Upper zodiac this bird is located under Taurus, next to the Sun, and on the Lower zodiac, it is under Leo. Since the bird figure on the Upper zodiac is

extensively damaged, it is impossible to establish strong similarities between these two symbols. Only one spread wing and legs of the bird are clearly visible on the Upper zodiac. In this situation, we can identify only one common characteristic for these two birds — the spread wings. However, on the Lower zodiac, the bird under Leo was well preserved and all the details are visible. One can easily distinguish a snake-like tail and the beak also in a shape of a snake. Its wings are spread. Among all the birds on the two Athribis zodiac, there is no another bird that is similar to this one. In this way, this symbol can possibly correspond only to the partially destroyed bird under Taurus on the Upper zodiac. In addition, all their visible details can be matched, so these two symbols represent the same planet in the main horoscope on the Upper and Lower zodiacs. We will call it planet #4.

No other fantastic birds with horns or snake-like tails are shown on the Athribis zodiacs. However, on each of these zodiacs there is a representation of one more "usual" bird — inside the discs over Libra. These two birds are almost identical. As we've already explained it in subsection 5.9.1, these are the symbolic representations of the Paschal Full Moon. In the case of each of the Athribis zodiac, this symbol is a part of a supplementary astronomical scene located at the bottom of the zodiac. On the color annotated zodiacs (see Figures 8.3 and 8.4), these scenes are marked in green. In addition, let us point out that the bird in the circle is shown *over* the symbol of Libra, while all the planets are always shown *under* the constellation symbols. This could be an indication that the symbol of a bird inside the circle is not related to the main horoscope.

Consequently, we've obtained the following pictures of the main horoscopes on the two Athribis zodiacs (see Figures 8.3 and 8.4):

UPPER ATHRIBIS ZODIAC:

In Capricorn — the planet #3.
In Pisces — the planet #1.
In Taurus — the Sun, Mercury and the planet #4.
In Gemini or Cancer — the planet #2.

LOWER ATHRIBIS ZODIAC:

In Capricorn — the planet #3.
In Capricorn or Aquarius — the Sun (notice that the Sun is shown here on the border between these two constellations).
In Aquarius or Pisces — the planet #2.
In Pisces — Mercury.
In Leo — the planet #4.
In Sagittarius — Moon.

Notice that all the planetary symbols on the Athribis zodiacs are placed under corresponding to them constellations. In this way, there is no misunderstanding how to interpret a planetary symbol located in between two constellations — one above it and another one below it. Nevertheless, in order to avoid any possibility for a mistake, we also considered the variants with the planetary symbols above the corresponding constellations.

Let us discuss now all the possible identifications of the fantastic four birds on the Athribis zodiacs with the planets Saturn, Jupiter, Mars and Venus. For each of those variants of decodings we computed all the astronomical solutions. Next, we looked among them for a pair of solutions such that their dates could be covered by a human lifespan. Let us explain that on the Athribis zodiacs , the most probably are commemorated the dates of the birth and death of the buried in that cave person, or possibly, the dates of death of two close relatives. In the both cases, the difference between these two dates shouldn't be too large — for example, it should be less than 100 years.

In order to reduce the number of possible cases for the identifications of the four planets on the Athribis zodiacs, we use the following simple astronomical observation. Venus should be located not more than 40^o from the Sun, i.e. they shouldn't be separated by more than one full constellation. Then, it is easy to check that only the planet #2 can be Venus. Indeed:

- On the Lower zodiac, the Sun and the planet #1 are separated by at least three full constellations (Taurus, Aries, Pisces). Thus, the planet #1 is not Venus.
- On the Upper zodiac, the Sun and the planet #3 are separated by at least three full constellations (Aries, Aquarius, Pisces). Thus, the planet #3 is not Venus.
- Between the Sun and the planet #4, on the Lower zodiac, there are at least four full constellations (Sagittarius, Scorpio, Libra, Virgo). Again, the planet #4 can not be Venus.
- Finally, the Sun and the planet #2, on the both Athribis zodiacs, are separated by at most one constellation. In the Upper zodiac, the Sun is in Taurus, while the planet #2 is in Cancer, and in the Lower zodiac, the Sun and the planet #2 are both in Capricorn.

In this way, the only possible choice for Venus is the planet #2. It is represented by a figure of a bird with two antelope-like horns pointing upwards. Notice that none of the "ferocious" birds, with snake-like attributes or with big beaks, couldn't be considered as Venus. The bird representing the planet #2 has a "gentle" look, and it fits well Venus.

We will identify the three remaining planets by considering all the possible combinations. There are exactly 6 possible way the planets #1, #3 and #4 can be identified with Jupiter, Saturn and Mars. We use the codes A_1, A_2, A_3, A_4, A_5, and A_6, to denote the variants for these decodings, which are listed in Table 8.1.

Let us explain the contents of Table 8.1. All the possible variants of identification the planets #1, #3 and #4 with Jupiter, Saturn and Mars, are listed in 6 rows of Table 8.1. For example in the variant A_3 the planet #3 is identified as Jupiter, the planet #1 as Saturn, and the planet #4 as Mars.

Code	Jupiter	Saturn	Mars
A_1	1	3	4
A_2	1	4	3
A_3	3	1	4
A_4	3	4	1
A_5	4	1	3
A_6	4	3	1

Table 8.1: *Possible Identifications of the Planets on the Athribis Zodiacs.*

8.1.2 Partial Horoscopes and Supplementary Scenes on the Athribis Zodiacs

On the Athribis zodiacs, the symbols of the partial horoscopes are located in a sequence of figures surrounding the zodiacs. The only exceptions are the supplementary scenes of the Full Paschal Moon. On the color annotated Athribis zodiacs (see Figure 8.3 and 8.4) this fringe of figures surrounding the zodiacs is marked in lightblue. The symbolism of these figures was already discussed in Chapter 5.

In principle, this encircling arrangement of figures is composed mainly of the equinox and solstice symbols. On the Upper zodiac, in its right upper corner over the symbol of Gemini, there is a figure with four faces holding a planetary walking stick. On the other Egyptian zodiacs, similar figures with four heads were used in connection to the solstice and equinox points, but not as planetary symbols in the partial horoscopes (see section 5.8). Nevertheless, there is one partial horoscope with planetary figures. It is the partial horoscope of the summer solstice on the Lower zodiac. This partial horoscope was already discussed in subsection 5.8.3, so we only recall its contents (see Figure 5.61).

This partial horoscope contains five figure of birds with human faces, which clearly symbolize the planets Mercury, Venus, Jupiter, Saturn and Mars. Let us recall that planets on the Athribis zodiacs are almost always shown as birds. The Sun is shown here as a figure of a man with a raised hand. This is a standard representation of the Sun on the Egyptian zodiacs in the summer solstice partial horoscopes (see section 5.8). There is no symbol of Moon in this partial horoscope. On the Egyptian zodiacs Moon was usually shown as a crescent or a disc, and it is clear that there is no such symbol here.

Notice that two of the birds-planets are placed on the left side of the Sun (represented by the figure of a man with a raised hand) and three other birds-planets are on its right side. The two birds on the left are accompanied by hieroglyphic inscriptions. H. Brugsch translated them as *Meri-Gor* and *Ab-Ne-Mani*.[3] In addition, the bird on the far left has female face, so it is probably Venus. The whole partial horoscope of the summer solstice on the Lower zodiac is arranged in such a way that it is facing Gemini, so it is exactly like it should be on the Egyptian zodiacs (see section 5.8). Let us recall that the Sun on the summer solstice day was in Gemini.

In this way, on the day of the summer solstice Mercury, Venus, Jupiter, Saturn and Mars should be located in Gemini, or around it. Moreover, two of these planets (one of them Venus — represented by the bird with female face) are shown over the head of the Sun. That position indicates that these two planets were located in the morning visibility side of the Sun. The three other planets were on the other side of the Sun (under its feet), i.e. in the evening visibility side. Let us recall that the planets, which we can observe before or at the dawn, appear to be ahead of the Sun, while those planets that are visible after the dusk seem to follow the "steps" of the Sun.

In summary, according to the partial horoscope of the summer solstice on the Lower zodiac, on that day Mercury, Venus, Jupiter, Saturn and Mars, were located in the proximity of the Sun, which at that time was in Gemini. Two planets were "above the head" of the Sun, i.e. in its morning visibility side. Among these two planets, the one that was more distant from the Sun, was Venus. Three other planets were in the evening visibility side of the Sun.

There are no other partial horoscopes on the Athribis zodiacs. There are only typical symbols of the solstices and equinoxes surrounding the zodiacs, which of course are not useful for the astronomical dating. However, there is another detail that can provide us with some additional information. It is a "meeting" scene, where two figures are shown holding hands on the top of a lion. It is located near the left bottom corner of the Upper zodiac. The lion has a human head. It is possible, it's a female head, so it could be a lioness. The two figures on the lion's back are of male gender. One of them is two-faced — possibly it represents Mercury. We have discussed it earlier, that on the Egyptian zodiacs, Mercury is very often shown as a male figure with two faces. On the other hand, a lion or lioness symbolized Venus in the constellation of Leo (or close to it). Therefore, in our opinion this whole scene could symbolize a meeting of Mercury and another male planet in in Leo. Moreover, Venus at that time was also in Leo. Certainly, our interpretation of this symbol on the Upper zodiac should not be considered as unique or conclusive. It is possible that other explanations could also be presented. In any case, the final solutions for the Athribis zodiacs will clarify the meaning of this scene and provide us with the needed explanation. Notice that the presence of the two-faced figure in this meeting scene, is already sufficient to determine that it is dedicated to a certain planetary configuration involving Mercury and the constellation of Leo.

8.1.3 Results of Computations for the Six Variants of Decoding

In this subsection we present the results for all six possible decodings of the main horoscopes on the Athribis zodiacs. These results are presented in Table ??23. The corresponding data files for the program HOROS are listed in Appendix ?? under the codes $AN1$, $AN2$, ..., $AN6$ — for the Lower

[3] See [4], Vol. 6, p. 729.

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zodiac, and $AV1$, $AV2$, ..., $AV6$ — for the Upper zodiac. As usual, we consider only these solutions for which the order of planets on the ecliptic is exactly the same as shown on the Athribis zodiacs. However, exceptions were made in the case when two planets were in a distance smaller than 1^o. In such a case, the order of planets may not be recognized by the naked eye. We were looking for the solutions in the time interval from 500 B.C. to 2000 A.D.

Let us list the exact dates of all the obtained solutions shown in Table 8.2. Below, we will call the *mean discrepancy from the best points* simply by the *mean discrepancy*.

Decoding variant A_1. Upper zodiac: May 21–23, −244, the mean discrepancy 14^o; May 21–22, 1962, the mean discrepancy 13^o. Lower zodiac: no solutions.

Decoding variant A_2. Upper zodiac: May 13, 408, the mean discrepancy 17^o. Lower zodiac: February 2, 1125, the mean discrepancy 11^o.

Decoding variant A_3. Upper zodiac: May 16–18, −447, the mean discrepancy 14^o. Lower zodiac: no solution.

Decoding variant A_4. Upper zodiac: April 11, −327, the mean discrepancy 19^o; May 20–22, 1262, the mean discrepancy 16^o. Lower zodiac: no solution.

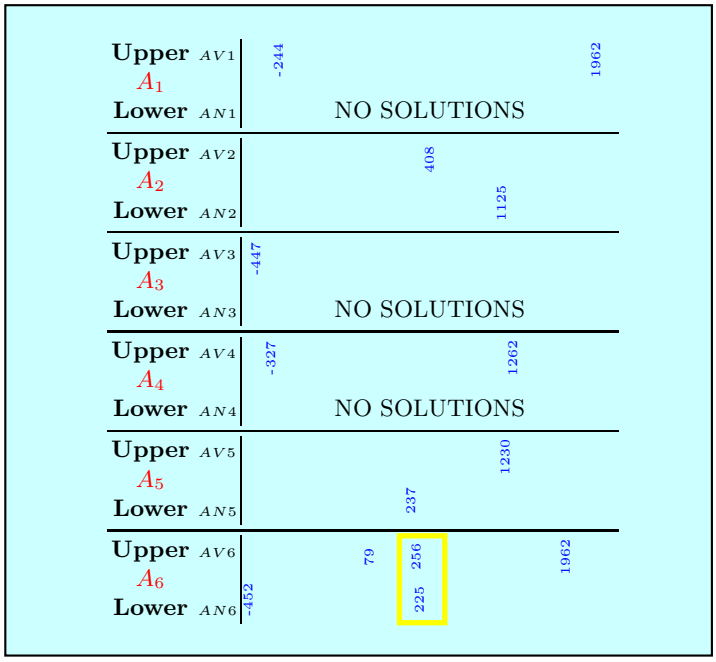

Table 8.2: *Astronomical solutions for the Upper and Lower Athribis zodiacs for all six variants of decoding A_1, A_2, A_3, A_4, A_5 and A_6, of the main horoscopes. Only the years of the dates are listed.*

Decoding variant A_5. Upper zodiac: May 15–16, 1230, the mean discrepancy 7^o. Lower zodiac: February 7–8, 237, the mean discrepancy 14^o.

Decoding variant A_6. Upper zodiac: May 21–22, 79, the mean discrepancy 15^o; May 12, 256, the mean discrepancy 19^o; June 2–3, 1847, the mean discrepancy 15^o. Lower zodiac: January 10–11, −452, the mean discrepancy 9^o; January 21–23, 225, the mean discrepancy 8^o.

It is clear from Table 8.2 that there is only one pair of solutions, corresponding to the decoding variant A_6, which are relatively close one to the another. These solutions are: May 12, 256 — for the Upper zodiac, and January 21–23, 225 — for the Lower zodiac. There is no other pair of solutions that could be considered as acceptable from this point of view. The other pair of solutions, for which the difference is around 150 years (also for the variant A_6) are the years 79 and 225. All the remaining pairs of solutions are no closer than 600 years.

However, it turned out that this pair of solutions does not lead to full solutions for the Athribis zodiacs. The problem here is that the year 225, which is the solution for the Lower zodiac, does not satisfy the conditions specified above for the partial horoscope of the summer solstice. Let us recall, that on the summer solstice day in the proximity of the Sun there should be five planets: Mercury, Venus, Jupiter, Saturn and Mars. For the solution: January 21–23, 225, there are two possible choices of the corresponding summer solstice day. The first one depends on the assumption that for the author of the Athribis zodiacs, the year began around the autumn equinox or winter solstice day. In this case, it would be either in September or January, and the summer solstice day corresponding to this solution, would take place in June 225. The second possibility would be, if for the author, the year began around the spring equinox or summer solstice day. Then, the corresponding to this solution the summer solstice would take place in June 224. In order to avoid potential mistakes, both possibilities were taken into account. Nevertheless, in either case no satisfactory result was obtained.

In the case, the beginning of the year was assumed to take place in September or January, on the summer solstice day of June 20, 225, there were only four planets (without counting the Sun and Moon) in Gemini and the neighboring constellations of Leo, Cancer, Taurus and Aries. Those planets were: Jupiter and Mars in Leo, Mercury in Gemini, and Venus in Taurus (close to Gemini). The Sun was of course in Gemini. In the same time, Saturn was in Capricorn — on the opposite side of the ecliptic, so there was no way it could be included in the partial horoscope of the summer solstice. In summary, the astronomical picture associated with the solution January 21–23, 225, doesn't agree with the partial horoscope of the summer solstice. On the summer solstice day, there should be five planets located in the proximity of the Sun, but for this solution there were only 4 planets there. Since the symbol of Moon (a crescent or a disc) is missing from this partial horo-

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scope, it would be a mistake to consider Moon as the fifth planet.

In the case the beginning of the year was assumed be in March or June, there are the same problems related to the solution of January 21—23, 225. On the summer solstice day, which was on June 20, 224, Saturn was also in Capricorn. In this way there couldn't be five planets near the Sun on that day. Clearly, the conditions specified in this partial horoscope are not satisfied.

Consequently, we have to acknowledge that, as far as the above variants of decoding are concerned, we were not able to find full solutions for the Athribis zodiacs. However, let us notice, that our computations were based on very strict requirements expected from the astronomical solutions. The problem may be related to the fact that on the both Athribis zodiacs there are shown clusters of planets in the proximity of the Sun. This situation is particularly visible on the Lower zodiac, where three planets around the Sun are present. It is clear that the proximity to the Sun could result in invisibility of some of those planets. In such a case, the order of these planets couldn't be determined by a direct observation. Of course it was still possible to speculate, based on the observed relative velocities and the positions of the planets, how the order of planets was changing, even if some of them were already invisible. However, the exact computations in such a case would require a lot of work and time. Therefore, if the Athribis zodiacs were created based on the direct astronomical observations, then the order of some, invisible at the time of observations, could be incorrect. This possibility should be definitely considered.

8.1.4 Results of Computations for the Six Variants of Decoding with Arbitrary Order of Invisible Planets

In this subsection we present the results for all six possible decodings of the main horoscopes on the Athribis zodiacs. This time, we do not require from solutions that the order of the planets in the proximity of the Sun is necessarily the same as on the main horoscopes. These results are presented in Table 8.3. The corresponding data files, used for the program HOROS, are listed in Appendix **??** under the codes ANA, ANB, ANC, AND, ANE and ANF – for the Lower zodiac, and AVA, AVB, AVC, AVD, AVE and AVF – for the Upper zodiac. We were looking for the solutions in the time interval from 500 B.C. to 2000 A.D.

Since the program HOROS can not verify the visibility conditions for planets, the computations were carried on in several steps.

In the first step, we used the program HOROS to find the all possible astronomical solutions, regardless of the order of those planets that were close to the Sun. On the Upper zodiac, this group of planets included the Sun and two other planets, and on the Lower zodiac — it was the Sun and three other planets.

| | | |

discrepancies for the solutions obtained here may be different from those calculated in the subsection 8.1.3. All the input data for our calculation is included in Appendix **??**.

Decoding variant A_1. Upper zodiac: May 21–23, -244, the mean discrepancy 15^o; May 21–22, 1962, the mean discrepancy 13^o. Lower zodiac: no solutions.

Decoding variant A_2. Upper zodiac: May 13, 408, the mean discrepancy 19^o. Lower zodiac: January 18–20, 448, the mean discrepancy 10^o; February 2, 1125, the mean discrepancy 10^o.

Decoding variant A_3. Upper zodiac: May 16–18, -447, the mean discrepancy 14^o. Lower zodiac: no solution.

Decoding variant A_4. Upper zodiac: April 11, -327, the mean discrepancy 19^o; May 20–22, 1262, the mean discrepancy 16^o. Lower zodiac: no solution.

Decoding variant A_5. Upper zodiac: May 15–16, 1230, the mean discrepancy 7^o. Lower zodiac: February 7–8, 237, the mean discrepancy 13^o; February 8–11, the mean discrepancy 6^o (for February 9–10).

Decoding variant A_6. Upper zodiac: May 21–22, 79, the mean discrepancy 15^o; May 12, 256, the mean discrepancy 19^o; May 18, 459, the mean discrepancy 12^o; June 2–3, 1847, the mean discrepancy 15^o. Lower zodiac: January 10–11, -452, the mean discrepancy 10^o; January 21–23, 225, the mean discrepancy 8^o.

As it is clear from the Table 8.3, there are only three pairs of solutions that are close enough to be acceptable for the dating of the Athribis zodiacs:

(1) The years 408 and 448. The corresponding mean discrepancies for these solutions are 19^o and 10^o respectively;
(2) The years 1230 and 1268. The corresponding mean discrepancies for these solutions are 7^o and 6^o respectively;
(3) The years 256 and 225. The corresponding mean discrepancies for these solutions are 19^o and 9^o respectively.

However, the third pair of solutions (the years 256 and 225) was already rejected. Let us recall (see subsection 8.1.3) that the date 225, which was obtained for the Lower zodiac, was incompatible with the partial horoscope of the summer solstice. In fact, replacing of the date 225 with the date 79 does not help either.

In this way we have to analyze the two remaining pairs of dates: the years 408 and 448, and the years 1230 and 1268. As we are going to see it in a moment, the first of these two pairs will be also rejected, while the second one will turn out to be an ideal pair of final solutions for the Athribis zodiacs. In the subsequent subsections, we will investigate these solutions in a detailed and complete manner. In Appendix **??**, we included supplementary computations to demonstrate that even in the case of less restrictive variants of decoding, it is not possible to find another pair of full solutions.

Let us begin with the pair of solutions: May 13, 408 — for the Upper zodiac and January 18–20, 448 — for the Lower zodiac. The planetary positions on these days are presented in Table 8.4.

Julian day (JD) = 1870213.00 UPPER ZODIAC Year/Month/Day = 408/5/13						
Sun	Moon	Saturn Pl. #4	Jupiter Pl. #1	Mars Pl. #3	Venus Pl. #2	Mercury
75.1^o Taurus	96.6^o Gemini	38.6^o Aries	338.4^o Aquar	298.6^o Sag/Cap	98.3^o Gemini	91.2^o Gem/Tau
Mean Distance from the Best Points = 19^o Variant of Decoding: A_2, Code of Data: AVB or $AV2$						
Julian day (JD) = 1884708.00 LOWER ZODIAC Year/Month/Day= 408/1/19						
Sun	Moon	Saturn Pl. #4	Jupiter Pl. #1	Mars Pl. #3	Venus Pl. #2	Mercury
322.1^o Capric	286.0^o Sagitt	175.0^o Leo/Vir	91.6^o Gemini	315.7^o Capric	319.1^o Capric	336.9^o Aquar
Mean Distance from the Best Points = 10^o Variant of Decoding: A_2, Code of Data: ANB						

Table 8.4: *Solutions: May 13, 408 and January 18–20, 448 for the Upper and Lower Atribis zodiacs*

Let us point out that the planetary positions, in the obtained for the Upper zodiac solution, do not satisfy all the specified earlier requirements (see subsection 8.1.1). Indeed, the planet #4, which in this identification is representing Saturn, is shown on the Upper Athribis zodiac under Taurus, right below the Sun, while the space under Aries is clearly empty. There is no doubt that the author of the Athribis zodiacs could easily place this planet under Aries, if it was really the proper place for it. Instead, the planet #4 was placed under Taurus, in a cluster with the Sun and Mercury. Since Saturn was in Aries, 12^o from the border with Taurus and its distance from the Sun was 36^o, it is not possible to accept this solution. In addition, the "meeting scene in Leo" does not match this solution either. In the summer of the year 408, Venus was passing through the constellation of Leo completely alone. Mercury, which at that time was returning towards the Sun, was located in Gemini and Cancer. Mars was between Capricorn and Aquarius, i.e. on the opposite side on the ecliptic, Jupiter was in Aquarius, and Saturn in Aries. In other words, all these planets were far away from Leo (according to the computations done using the program Turbo-Sky). Thus, during the year 408, Mercury did not meet any other male planet in Leo. Consequently, this solution do not agree at all with this astronomical scene on the Upper zodiac. Of course, it is always possible to come up with some mysterious explanations in order to justify the "correctness" of a solution. Such practices are not unusual even in the present times. However, based on our experience with the Egyptian zodiacs, we do not see any evidence that symbols with non-astronomical meaning were ever depicted in these zodiacs. On the contrary,

we found out that the symbolism of the Egyptian zodiacs was always strictly connected with a precise description of certain astronomical events. Therefore, we expect that a full solution should be a key to clarify the hidden astronomical meaning of the symbolic scenes shown on the zodiac. This is clearly not the case for this solution.

Let us now consider the solution: January 18–20, 448, which was obtained for the Lower zodiac. We are interested in how well this solution matches the information decoded from the Lower zodiac. This date wasn't consider in the previous calculations. That means, some of the invisible on this date planets were not in the same order as the planets shown on the Lower zodiac. The listed on that date planetary positions in Table 8.4 indicate that the location of Venus on the ecliptic was on the other side of the Sun than it is indicated on the Lower zodiac. At that time Venus was very close to the Sun — the longitude distance between them was less than 3^o. That means, Venus was completely invisible in the rays of the Sun. In such a situation, it was impossible for an Earth-based observer to determine the exact order of these two celestial objects on the ecliptic. Therefore, in this case this is not a sufficient reason to reject this solution. In fact, the locations of all the other planets are exactly as they are shown on the Lower zodiac.

As we explained it earlier, there are two possible choices for the summer solstice date related to the solution of January 18–20, 448. The first one, is the summer solstice day in the year 448 — corresponding to the beginning of the year in September or January. The second choice is the summer solstice day in the year 447 — corresponding to the beginning of the year in March or June. Let us point out that all the previously analyzed by us Egyptian zodiacs turned out to be based on the beginning of the year in September, i.e. around the autumn equinox day. Nevertheless, we should not exclude a possibility that there are some zodiacs using a different convention for the beginning of the year, for example, the spring equinox day in March or the summer solstice day in June. Consequently, we will continue to verify all the possible variants in this respect.

The calculations done by the program Turbo-Sky, indicate that in June of 447 as well as in June of 448, on the day of the summer solstice, all five planets gathered around the Sun in Gemini. This planetary configuration was very similar to the partial horoscope of the summer solstice shown on the Lower zodiac. In the year 448 this agreement was not complete. However, in the year 447, the planetary positions on the summer solstice day perfectly fit the picture on the Lower zodiac.

Let us discuss these two cases in a more detailed manner. On the summer solstice day in the year 448, which occured on June 19, the planets were located in the following positions: Saturn and Venus — in Leo; Jupiter, the Sun and Mercury — in Gemini; Mars — in Taurus. These positions indicate that Venus at that time could only be visible in the evening, so it was located "under the Sun's feet." Nonetheless, in the partial horoscope on the Lower Athribis zodiac, Venus is shown above "the Sun's head" in a company of another planet. It is clear that basically we do have an agreement between the solution and the zodiac, but still it is not perfect.

On June 19, 447, just a day earlier before the summer solstice day, the planetary configuration fits perfectly well the picture of the partial horoscope of the summer solstice on the Lower zodiac. On that day the order of the planets was as follows (calculations were done using the program Turbo-Sky): Mars, Saturn, Mercury appeared in the evening in Leo and Cancer, i.e. they were "under the Sun's feet"; the Sun was in Gemini; Jupiter and Venus were in Taurus — visible in the morning, i.e. "over the Sun's head." These planetary locations match exactly the partial horoscope of the summer solstice on the Lower zodiac.

Let us summarize our analysis of this pair of the solutions for the Athribis zodiacs: May 13, 408, — for the Upper zodiac, and January 18–20, 448, — for the Lower zodiac. Among these two dates, only the second one completely satisfies all the requirements expected from a full solution. For the first date, the **position of Saturn does not agree** with the situation shown on the Upper zodiac. In addition, it contradicts the "meeting scene in Leo" on the Upper zodiac. Consequently, this pair of solutions (the year 408 and the year 448), is not full. In the case there is no better pair of solutions, this two dates could be called *conditional solutions* for the Athribis zodiacs. However, as we are going to see it in the next subsection, a unique pair of full solutions indeed exists.

8.1.5 Final Solutions for the Athribis Zodiacs: the Lower Zodiac — May 15-16, 1230 AD, the Upper Zodiac — February 9-10, 1268 AD.

It turned out that the second pair of solutions (see subsection 8.1.4 is complete. It fully satisfies all the requirement related to the order of the visible planets and it also fulfills all the additional information decoded from the Athribis zodiacs. This pair of solution was:

May 15–16, 1230 AD. — for the Upper zodiac, with the mean discrepancy from the best points was only 7^o, and

February, 1268 AD. – for the Lower zodiac, with the mean discrepancy from the best points only 6^o. Let us point out that such small mean discrepancy values occurs very rarely. They can be viewed as an indication that apparently there is an extremely good match between the solutions and the zodiacs.

In Table 8.5 we list the exact planetary locations on the ecliptic J2000 for these two solutions. For each of these dates, we indicate in degrees the positions of the planets on the ecliptic J2000. In the next row below, we show the same locations using their coordinates on the constellation scale (see section 6.10). Finally, for each of the listed planets we specify its corresponding zodiacal constellation.

Julian day (JD) = 2170451.00 UPPER ZODIAC Year/Month/Day = 1230/5/16						
Sun	Moon	Saturn Pl. #1	Jupiter Pl. #4	Mars Pl. #3	Venus Pl. #2	Mercury
72.6^o 1.55 Taurus	104.9^o 2.53 Gemini	4.4^o 11.45 Pisces	81.0^o 1.77 Taurus	329.6^o 10.01 Cap/Aq	116.3^o 2.92 Ge/Cap	87.8^o 1.95 Ge/Tau
Mean Distance from the Best Points = 7^o Variant of Decoding: A_5, Code of Data: AVE						
Julian day (JD) = 2184234.00 LOWER ZODIAC Year/Month/Day= 1268/2/9						
Sun	Moon	Saturn Pl. #1	Jupiter Pl. #4	Mars Pl. #3	Venus Pl. #2	Mercury
337.9^o 10.49 Capric	278.9^o 8.35 Sagitt	104.2^o 2.50 Leo/Vir	144.3^o 4.02 Gemini	322.9^o 9.76 Capric	328.2^o 9.95 Capric	339.0^o 10.55 Aquar
Mean Distance from the Best Points = 5.5^o Variant of Decoding: A_5, Code of Data: ANE						

Table 8.5: *Solutions: May 16, 1230 and February 9, 1268 for the Upper and Lower Atribis zodiacs*

With help of the Turbo-Sky program we were able to verify for each of the planets its visibility conditions.

VISIBILITY CONDITIONS for the Upper Zodiac: All the planets, except Jupiter, were well visible. On the evening on May 16, 1230, when Jupiter was descending behind the horizon in Cairo, the submersion of the Sun was SUH 7^o. At that time the brightness of Jupiter was ($M = -1.4$), so practically, it could not be visible even if its fade light appeared for few moments on the horizon. However, Mercury, which was not very far from Jupiter, was already visible. At the time, when Mercury was disappearing behind the horizon, the submersion of the Sun was already SUH14^o. On the same evening, the new moon just reappeared on the sky in Gemini. It was only two days old and it looked like a narrow crescent.

VISIBILITY CONDITIONS for the Lower Zodiac: On February 9–10, 1268, Mercury and Venus were not visible because of their proximity of the Sun. At that time, the distance from Mercury to the Sun was only one or two degrees, so Mercury completely disappeared in the rays of the Sun. On the other hand, Venus was located in the morning visibility side of the Sun. Before the dawn on January 9–10, 1268, Venus raised in Cairo, when the Sun was submerged only 5^o under the horizon. It was much too close to the Sun to be visible, although its brightness was $M = -3.4$. All the other planets were well visible, even Mars, which was closest to the Sun planet. When Mars appeared on the horizon in the morning of January 9–10, 1268, the submersion of the Sun was SUH 9^o. The brightness of Mars was $M = +1.4$, which was already sufficient for its visibility. Of course, Mars was only visible for a short time before it dissolved completely in the morning ray.

8.1.6 Validation of the Solutions with Respect to the Planetary Positions

For the above pair of solutions, we will now compare the exact positions of the planets with the locations of the corresponding planetary symbols on the Athribis zodiacs. Let us recall, that these solutions were found using the variant A_5 for the identification of Jupiter, Saturn and Mars (see subsection 8.1.1 for more details). The exact positions of all the planets on May 16, 1230 and February 9–10, 1268, are listed in Table 8.5.

PLANETARY POSITIONS ON THE UPPER ZODIAC according to the decoding variant A_5:

- SUN — in Taurus;
- Jupiter — in Taurus, located right under the Sun;
- Mercury — in Taurus near the border with Gemini, close to Jupiter;
- Mars — in Capricorn;
- Saturn — in Pisces;
- Venus — in between Gemini and Cancer;
- Moon — in Gemini, not far from Venus.

PLANETARY POSITIONS on May 15–16, 1230 (ACCORDING TO THE SOLUTION):

- SUN — in Taurus, Jupiter – the closest to the Sun planet;
- Jupiter — in Taurus, almost side by side with the Sun. Could be seen only on the horizon during the morning ray;
- Mercury — in Taurus next to the border with Gemini;
- Mars — on the border between Capricorn and Aquarius;
- Saturn — in Pisces;
- Venus — on the border between Gemini and Cancer;
- Moon — in Gemini, not far from Venus. It was the first re-appearance on the sky of the new moon. It was 2 days old.

PLANETARY POSITIONS ON THE LOWER ZODIAC according to the decoding variant A_5:

- SUN — in between Capricorn and Aquarius;
- Venus — in Aquarius or Pisces, close to Mercury and the Sun;
- Mercury — in Pisces or Aquarius, close to Venus;
- Mars — in Capricorn, it touches the Sun with its snake-like tail;
- Saturn — in Gemini;
- Jupiter — Leo;
- Moon — in Sagittarius.

PLANETARY POSITIONS on February 9–10, 1268 (ACCORDING TO THE SOLUTION):

- SUN — in Aquarius;
- Venus — in Aquarius, near the border with Capricorn;

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- Mercury — in the middle of Aquarius, not far from Pisces (Aquarius occupies only 17^o on the ecliptic);
- Mars — in Capricorn from the side of Aquarius, not far from the Sun, but visible;
- Saturn — in Gemini;
- Jupiter — on the border between Leo and Virgo;
- Moon — in Sagittarius, it looks like a crescent, it is 25 days old.

After comparing the planetary positions corresponding to the obtained solutions with the locations of the planets on the Athribis zodiacs, we have arrived to the following conclusion: the Upper zodiac perfectly matches the astronomical solution and the Lower zodiac almost perfectly fits the astronomical solution with the exception for Venus, which was invisible on the date indicated by the solution. Since Venus disappeared in the morning ray, the author of the zodiacs was not able to observe on which side of the Sun it was located at that time. In order to obtain this information, it was necessary to accomplish additional tasks. However, it is not reasonable to assume that the author of these zodiacs performed astronomical computations in order to determine the exact locations of the planets. In other words, we simply assume that the Athribis zodiacs were designed based on the astronomical observations only. From this point of view, the match between the planetary configurations on the both zodiacs and the corresponding astronomical solutions is ideal.

Consequently, we need only to verify if the astronomical solution for the Upper zodiac provides us with an explanation for the "meeting scene" in Leo, and for the Lower zodiac, to check if the solution satisfies the partial horoscope of the summer solstice.

Regarding the supplementary scenes illustrating the Paschal Moon on the Athribis zodiacs, they should not be considered as an argument for rejecting astronomical solutions. On the color annotated zodiacs, these scenes are marked in green. Their meaning was already discussed in subsection 5.9.1

8.1.7 Validation of the Solutions According to the Partial Horoscope of the Summer Solstice

Let us show the exact planetary locations on the ecliptic J2000 for the summer solstice days on June 12, 1268, and on June 12, 1267. The first of these dates, should be considered in the case the beginning of the year was assumed to take place in September or January, while the another one is according to the convention that the beginning of the year was in March or June.

Let us analyze the first date: June 12, 1268. In Table 8.6, we present for this date the positions of the planets on the ecliptic J2000 using degrees, as well as, the coordinates on the constellation scale (see section 6.10). In addition, for each of the listed planets we indicate the corresponding zodiacal constellation. Just by looking at these numbers, we can already say that our astronomical solution fits quite well the partial horoscope of the summer solstice on the Lower zodiac. On the summer solstice day, all the planets gathered indeed around the Sun in Gemini. Nevertheless, this correspondence with the partial horoscope is not perfect. The planetary configuration on that day was clearly different than the one depicted on the partial horoscope of the summer solstice on the Lower zodiac. Recall that on the Lower zodiac, there were three planets shown on one side of the Sun, while there were two more on the other side. But, on the June 12, 1268, there were four planets on the one side of the Sun (without counting Moon) and only one — Mars, on the other side. It is clear that these two configurations are different, so it is hard to consider them as matching.

Julian day (JD) = 2184358.00 — Summer Solstice Year/Month/Day = 1268/6/12 Beginning of the Year in September or January						
Mars	Sun	Moon	Saturn	Mercury	Venus	Jupiter
57.1^o	98.6^o	101.6^o	112.4^o	117.4^o	121.0^o	148.1^o6
1.15	2.31	2.41	2.79	2.96	3.10	4.15
Taurus	Gemini	Gemini	Gemini	Gemini	Cancer	Leo

Table 8.6: *Planetary Positions on June 12, 1268*

Let us look now on the second date: June 12, 1267. This is the date of the summer solstice (with accuracy of 1–2 days) in the year indicated by the solution (February 8–11, 1268) according to the convention that the beginning of the year was in March or June. We should remember that in the present times the beginning of the year is in January, that's why we got here two different years. In Table 8.7, we list the positions of the planets on June 10, 1267, i.e. two days before the summer solstice day. The planetary configuration on that day was very close to the picture shown on the Lower zodiac. In fact, even two days later, on June 12, 1267, these similarities still remained very strong. The only difference was that Mercury managed to move on the other side of the Sun. Since at all that time Mercury was located in close proximity to the Sun, it was not visible, so it is clear that these changes couldn't be observed with a naked eye. Thus, the author of the Athribis zodiacs could only speculate what was the appropriate side of the Sun to show Mercury. We should also remember that in this epoch, there were no yet available precise timekeeping devices. Even in the 14th century books, the dates of the solstices and equinoxes were determined with errors up to 5–6 days.

It is clear that we have here a perfect match, up to the smallest detail.

Indeed, on June 10, 1267, all the five planets: Mercury, Venus, Jupiter, Saturn and Mars, gathered around the Sun. Their configuration was exactly the same as shown on the

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Julian day (JD) = 183990.00 — Summer Solstice Year/Month/Day = 1267/6/10 Beginning of the Year in March or June						
Venus	Mercury	Sun	Saturn	Jupiter	Mars	Moon
76.5^o	95.0^o	96.0^o	99.7^o	122.6^o	151.6^o	301.3^o
1.66	2.19	2.22	2.35	3.16	4.26	8.99
Taurus	Gemini	Gemini	Gemini	Cancer	Leo	Capricorn

Table 8.7: *Planetary Positions on June 10, 1267*

partial horoscope of the summer solstice on the Lower zodiac. Two planets — Venus and Mars, were located above the "head of the Sun," i.e. they were in the morning visibility side of the Sun. The remaining three planets were under the "feet of the Sun," i.e. in the evening visibility side of the Sun. Surprisingly, the location of Venus with respect to Mercury and the Sun, was precisely as it is illustrated on the Lower zodiac. It was further from the Sun than Mercury. Let us point out that Moon was missing from this partial horoscope, and indeed, on the day of the summer solstice in 1267, Moon was far away from the Sun. It was located almost on the opposite side of the ecliptic in the constellation of Capricorn. On the other hand, all the planets, except Moon, because of their proximity to the Sun, were included in this partial horoscope. Mercury and Saturn were in Gemini, next to the Sun, Venus was in Taurus, not far from Gemini, Jupiter was in Cancer close to its border with Cancer, and Mars was in the beginning of Leo, a little further from the Sun than other planets. The distance from Mars to the Sun was around 50^o and its position was almost at the middle point between the summer solstice point and the autumn equinox point. Therefore, the inclusion of Mars in the partial horoscope of the summer solstice seems completely justified and, in fact, it was necessary from the consistency point of view of the Egyptian zodiacs.

In summary, the astronomical solution of February 9–10, 1268, surprisingly well agrees with the partial horoscope, which we can easily call a perfect match. There is no even one detail that could be questioned in any way.

To conclude our verification, let us make some comments about the hieroglyphic inscriptions shown on the Lower zodiac near the figures of birds, which were identified by us to represent Venus and Mercury in the partial horoscope of the summer solstice. H. Brugsch translated them as *Meri-Gor* and *Ab-Ne-Mani*. Notice that these two inscriptions resemble the names Mercury and Venus. Indeed,

MERI–GOR = MERI–KOR = Mercury or MER(cury)–GOR
AB–NE–MANI = BNE–MANI = VNE–MANI = VEN(us)–MANI

Let us recall that Egyptian names were written using consonants only, and in most of cases in an arbitrary way. The sounds **B** and **V** were often interchangeable, in particular in names. Hence, the contracted consonants *BN* in the word **AB-NE(MANI)** could in fact signify **VENE**. The Latin word **VENus**, with the usual for this language ending *us*, could be simply written as **VN** or **BN**. This is exactly what we see in this inscription.

However, it makes no difference if we know the exact interpretation of these hieroglyphic inscriptions or not. We can already say with full confidence that this astronomical solution perfectly agrees with the partial horoscope of the summer solstice on the Lower Athribis zodiacs. What is particularly interesting about this solution, is the fact that the beginning of the year was considered to take place either in March or June. In the case to the previously analyzed zodiacs, the beginning of the year was always in September. In subsection 8.1.9, we will return to the questions related to the convention of the beginning of the year on the Athribis zodiacs.

8.1.8 Verification of the "Meeting Scene above the Lion"

We will now verify if the astronomical solution of May 15-16, 1230, agrees with the "meeting scene" above the figure of lion. This scene, which is shown in the surroundings of the Upper zodiac above its left lower corner, was already discussed in subsection 8.1.2. There are two male figures, holding hands on the top of a lion, shown in this scene. One of them has two faces — it is possibly Mercury. The other figure could represent Saturn, Jupiter or Mars. The lion, or lioness has a human head — possible female. As we have seen previously on the other Egyptian zodiacs, such a figure of a lion or lioness symbolizes Venus in Leo.

Let us check what was happening in the constellation of Leo at the time Venus and Mercury were passing through it in the year of the solution. Since these two planets stay always in the proximity of the Sun, it is easy to approximate the time of such an event: June–September, i.e. when the Sun is crossing the constellations of Gemini, Cancer, Leo and Virgo.

There are again two possible cases, depending on the beginning of the year. If the beginning of the year took place in the spring, winter or autumn, then we should look into the period from June till September, 1230. On the other hand, if the beginning of the year was in the summer, what could be around the summer solstice day, then we should consider it in 1229. Notice that the confirmation of one of these possibilities can clarify the convention of the new year in the case of the Athribis zodiacs. Since we already know from the previous subsection (see subsection 8.1.7) that the beginning of the year was either in March or June, the "meeting scene" in Leo may help us to eliminate one of these months.

Notice, that the Athribis zodiacs are different from other Egyptian zodiacs. Except for the partial horoscope of the summer solstice on the Lower zodiac, there are no other partial horoscopes indicated on the Athribis zodiacs. None of the constellations corresponding to the other three solstice and equinox points, i.e. Virgo, Pisces, and Sagittarius, is distinguished in any way. The symbolism of the solstice and equinox

points appear only in the fringe of figures surrounding the zodiacs. It is the most striking that among all these points, only the summer solstice point was given such a great deal of attention. It is not very usual for the Egyptian zodiacs.

Let us try to locate the "meeting scene" in Leo either in the year 1229 or 1230. Using the program Turbo-Sky, we were able to determine that from June till September 1230, when Venus and Mercury were passing through Leo, all three other planets – Mars, Saturn and Jupiter, were not far from them. Mars was in Aquarius, Saturn in Pisces near the border with Aquarius, Jupiter in Gemini. However, this configuration excludes the possibility of a meeting between Mercury and another male planet in Leo during that period of time in the year 1230. However, such a "meeting scene" was almost immediately found in the year 1229, and the match was literally perfect. Indeed, on August 24, 1229, before the dawn in Cairo, the constellation of Leo raised on the sky, where three planets — Mercury, Mars and Venus, were visible. At that time, Mercury and Mars were side by side, in a distance of one degree one from another, and Venus was 2^o from Regulus (Alpha Leonis) — the brightest star in that part of the sky. Notice that Regulus is located in the head of the lion — the symbol of Leo. All these planets were well visible in Cairo at 3:00 AM (GMT). The submersion of the Sun behind the horizon at the moment Mercury and Mars were rising in Cairo, was SUH=12^o. In that time, Venus and Regulus were already above the horizon (see Figure 8.6). The brightness of Mercury was $M = +0.1$ and for Mars it was $M = +2.1$, which can be compared with the brightness of the star of the first magnitude. Consequently, on August 24, 1229, the planets: Mars, Mercury and Venus, were very well visible by daybreak in Cairo. Let us recall that the brightness stars become visible with the submersion of the Sun behind the horizon of $SUH = 7^o$–8^o (see subsection 6.7.3). On the other hand, fade stars become invisible with the Sun's submersion of $SUH = 9^o$.

In summary, before dawn on this day in Cairo, Mercury and Mars could be observed side by side just above the horizon in Leo. A little higher, there was Venus next to Regulus — it was also well visible. All the other stars in that part of the sky already became invisible because of the rising Sun. This picture fits exactly the symbolic scene of a "meeting" between Mercury and another male planet. These two figures are shown standing over a lion, what simply means that the whole event took place in Leo. The fact that they hold each other hands indicates that it was a very "close meeting" — Mercury was "touching" the other planet. The lion has a female face, what is a usual way on the Egyptian zodiacs to represent Venus in Leo, when it is not far from Regulus.

In this way we were able to confirm that all the conditions expressed on the Athribis zodiacs, are perfectly satisfied by the pair of the astronomical solutions: May 15–16, 1230 AD. — for the Lower Zodiac, and February 9–10, 1268 AD. — for the Upper Zodiac. Consequently, these solutions are full. In what follows, we will demonstrate that there are no other full solutions for the Athribis zodiacs, even when admitting much larger margins for the planetary positions.

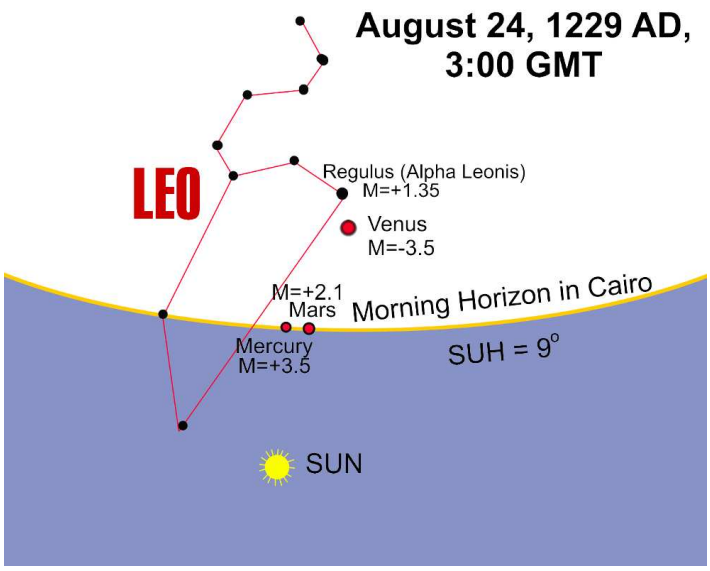

Figure 8.6: *Planets around the Sun on August 24, 1229 AD.*

8.1.9 Archaic Beginning of the Year in June on the Athribis Zodiacs

As an immediate corollary from our previous conclusions, we obtain that the beginning of the year on the Athribis zodiacs was considered to take place around the summer solstice day, i.e. in June — according to the Julian calendar. Indeed, based on the information included in the partial horoscope of the summer solstice shown on the Lower zodiac, the beginning of the year took place either in the spring or summer. Only in this case we get a perfect correspondence with our astronomical solutions. On the other hand, during the verification of the "meeting scene" in Leo, we got a confirmation that the author of the Athribis zodiacs was using a convention of the new year starting in the summer, i.e. in June. In this situation, there is no other choice for the beginning of the year.

This fact can provide us with some explanations clarifying why on the Athribis zodiacs there so much attention given to the summer solstice partial horoscope, while all the other partial horoscopes are completely ignored. Indeed, if the beginning of the year was assumed to happen around the summer solstice day, then the special distinction given to this partial horoscope becomes completely understandable. In fact,it would be strange if it wasn't.

Nevertheless, on all the other Egyptian zodiacs that we analyzed, the beginning of the year turned out to be always in September — around the autumn equinox day. This particularity can be an indication that the Athribis zodiacs are the oldest zodiacs that we are aware of. They used and archaic convention for the beginning of the astronomical year in the

summer — around the summer solstice day. This claim can be confirmed by the actual dates obtained for the Athribis zodiacs. Our full solution points out at the second half of the 13th century. This was probably the creation time of the Athribis zodiacs. The burial cave containing these zodiacs remained for a very long time covered with sands, till it was discovered in the beginning of the 20th century by the famous British archaeologist and Egyptologist Flinders Petrie.

It is probable that the other Egyptian zodiacs, were created later than the Athribis zodiacs. Although, in some cases, the dates represented on these zodiacs indicate an earlier epoch (for example the Denderah zodiacs show the dates from the 12th century), it is still possible that their actual construction took place much later. Let us point out that the Athribis zodiacs, contrary to the other zodiacs, which were discussed in Chapter 7, exhibit evidence that they were based on direct astronomical observations rather than computations. Notice that the pictures of the visible portion of the sky shown on the Athribis are very precise. On the other hand, in the case of invisible planets located in the proximity of the Sun, they are less exact and even contain some mistakes. None of the zodiacs from the temples in Denderah or Esna, had such a drastic difference in precision related to the visible and invisible parts of the sky. In the case of the Denderah and Esna zodiacs, the collected from the observations data was definitely completed by the astronomical computations. However, on the Athribis zodiacs we do not see any evidence of such computations, what brings us to the conclusion that they must be much older than the other zodiacs.

8.1.10 Final Identification of the Last Three Planets

Let us look more closely at the final identification of the birds-planets on the Athribis zodiacs. According to the decoding variant A_5, which brought us to the final solution, the planets: Jupiter, Saturn and Mars, are represented on these zodiacs as follows:

- **Jupiter** - the bird with a snake-like tail and snake-like head. On Figure 8.5, this symbol corresponds to the number 2;
- **Saturn** - the bird with horns in a shape of crescent. On Figure 8.5, this figure is denoted by the number 1;
- **Mars** - the bird with folded wings, a snake-like tail and strong beak. On Figure 8.5 it has the number 3.

We can easily conclude that none of the above attributes disagree with typical planetary characteristics observed on the other Egyptian zodiacs. The crescent on the head of a planetary figure is clearly an attribute of Saturn. We have seen such figures on the Denderah and Esna zodiacs. Ferocious look of the bird representing Mars agrees well with the "martial" aspect of this planet. Notice that, according to the ancient mythology, Mars was the god of war. F. Petrie, who was the first to study the Athribis zodiacs, associated the snake-like attributes of the bird #2 with Jupiter. He suggested that it symbolizes throwing thunders shaped in form of snakes.[4] Of course, such a statement can hardly be considered as a proof that this bird indeed represents Jupiter. Nevertheless, this argument can be seen as a reconfirmation of our identification.

In this way we arrive to the claim that the planetary symbols of Saturn, Jupiter and Mars, which were identified based on the decoding version A_5, are the symbols used originally by the authors of the zodiacs to represent these planets. According to our knowledge of the Egyptian planetary symbolism, it could be predicted how to identify these birds with the planets. Nevertheless, this identification was obtained automatically as a result of our computations leading to the final solutions. This beautiful agreement with the symbols on other Egyptian zodiacs, is just another confirmation of the correctness of our method.

8.1.11 Stability of the Obtained Solutions

In order to ascertain that no other full solutions for the Athribis zodiac exist, we carried on additional computations by allowing additional modifications of the decoding variants.

At first, we considered all the six decoding variants A_1–A_6 with the symbols of the Sun and Moon interchanged. As we have seen in Chapter 7, on some of the Egyptian zodiacs the symbols representing the Sun and Moon were not easy to identify. In the case of the Athribis zodiacs they could be identified without much trouble, nevertheless, we continued to look for solutions for all the reasonable variants of decoding, even those that were quite unlikely. It turned out that not even one pair of new solutions was found. For the Upper zodiac, there were only two solutions June 6–9, 1108 AD, and June 14–16, 1962 AD. for the decoding variant A_1, and one solution June 19–22, 1522 AD, for the decoding variant A_3. For the Lower zodiac no solution was found. In this way, we can considered the problem of the identification of the Sun and Moon on the Athribis zodiacs as closed.

Next, we relaxed the requirements on the expected planetary locations among the zodiacal constellations. Namely, for the cluster of planets located on the Upper zodiac under Taurus, and another cluster under Capricorn, Aquarius and Pisces — on the Lower zodiac, we allowed an arbitrary order of planets. In addition, for the individual planets their locations were no longer restricted to the suggested by the zodiacs positions. Since in the case of clusters of planets, it is not always possible to show exactly their relative positions, thus checking out these variants of decoding was fully justified. All the results of our computations are included in Appendix **??**. In summary, there was no new pair of full solutions found in this case either.

Consequently, we can confirm that the pair of solutions: May 15-16, 1230 AD. — for the Lower Zodiac, and February 9-10, 1268 AD. — for the Upper Zodiac, are the unique complete solutions for the Athribis zodiacs.

[4] See [4], Vol. 6, p. 731).

8.1.12 Conclusions

Our astronomical solutions passed successfully all the verifications of their agreement with the information shown on the both main horoscopes and in other scenes on the Athribis zodiacs. In particular, under the assumption that the beginning of the year was in June, they perfectly matched the partial horoscope of the summer solstice on the Lower zodiac and the "meeting scene" in Leo on the Upper zodiac. There are also strong indications that the zodiacs were created based on the direct observations, without help of astronomical computations to find locations of the invisible planets.

The date encoded in the Upper zodiac was May 15–16, 1230 A.D.

The date is encoded in the Lower zodiac is February 9–10, 1268 A.D.

Consequently, the Athribis zodiacs were created not earlier than the second half of the 13th century A.D.

The year on the Athribis zodiacs was considered to begin in June, right before the summer solstice day, or possibly on the summer solstice day. This feature makes the Athribis zodiacs unique among the other Egyptian zodiacs, where the beginning of the year was assumed to take place in September, on the autumn equinox day. The reason for such distinctiveness could be that the Athribis zodiacs are much older than other analyzed by us zodiacs.

8.2 Brugsch's Zodiac

Brugsch's zodiac was already discussed in section 3.4, including its story of discovery in the second half of the 19th century. It was painted on a wooden coffin excavated from an "ancient" Egyptian tomb. The tomb and the coffin were discovered by the famous German Egyptologist — Henri Brugsch. This "ancient" coffin was made using contemporary techniques of carpentry and was in a perfect condition. On its cover, there was a painting of a zodiac (see Figure 2.13).

In the center of the zodiac there is a figure of the goddess Nut wearing an embroidered long dress surrounded by zodiacal symbols and other figures. There is also a sequence of several Demotic inscriptions nearby some of the constellation figures on the left hand side of the goddess Nut. Brugsch was very excited by this discovery. In 1868, he published the first description of this zodiac in his book.[5]

H. Brugsch found out that the Demotic inscriptions on the zodiac were in fact the names of the planets, so there was a horoscope described on this zodiac. In section 3.4, this horoscope was simply called *Demotic horoscope* on Brugsch's zodiac. N.A. Morozov attempted the astronomical dating of the Demotic horoscope.[6] He performed a huge amount of work connected to the dating of this horoscope. Let us point out that the Demotic horoscope was decoded without any difficulty — the names of all the planets were simply written near the constellations where their locations were supposed to be (see Figure 3.14).

The results of Morozov's computations were appalling. In the whole historical time interval, beginning with the deep antiquity till our present times, there were only two solutions for the Demotic horoscope:

November 17, 1682 AD – the first solution of the Demotic horoscope;
November 18, 1861 AD – the second solution of the Demotic horoscope.

In respect of quality, these two solutions could be considered as equivalent (see section 3.4 for more details). In fact, besides these two, there was not even one less qualified solution found for this horoscope. N.A. Morozov accepted the first solution — the year 1682, and he assessed the second one as being too late. It would be really strange to admit that the date on the Demotic horoscope was just one year earlier than the date of publication of Brugsch's zodiac.

Let us recall (see section 3.4) that we were able to identify two other complete horoscopes on Brugsch's zodiac. These horoscopes were not just annotations, which could be added much later, but they were integral parts of the whole design of the zodiac. Neither H. Brugsch nor N.A. Morozov realized their existence on this zodiac. Each of them carries encoded inside certain date. It is an ideal situation for the purpose of astronomical dating — they are three complete horoscopes included on a single zodiac. Consequently, we expect that in the case of a successful dating, their three dates should refer to the same epoch.

We call these two new horoscopes the *horoscope in Boats* and the *horoscope without Walking Sticks*. We refer to section 3.4 for a more detailed presentation of this subject.

Now, we are passing to the dating of the horoscopes on the Brugsch's zodiac.

8.2.1 Annotated Demotic Horoscope on the Brugsch's Zodiac

There is nothing else that we could add to the Morozov's analysis of the Demotic horoscope. We have reproduced all his calculation and found out that his results were correct (see section 3.4 for more details). There were indeed only two solutions: the year 1682 and 1861. We postpone our discussion of these solutions till we find the dates of all the other horoscopes on Brugsch's zodiac. We assume that these three horoscopes are connected to the tomb where they were found, so all the three dates should be close one to another. It is very interesting to find out which one of the two solutions: 1682 or 1861 will turn out to be final. Clearly, getting the date of 1861 would be a rather unexpected and shocking. Nevertheless, we should be ready for all kinds of surprises resulting from the present version of the chronology, and the based on it history.

[5] See [14].
[6] See [4], Vol. 6.

Figure 8.7: *Fragment of Brugsch's zodiac containing the horoscope "Without Walking Sticks".*

8.2.2 Horoscope "Without Walking Sticks" on Brugsch's Zodiac

The horoscope "Without Walking Sticks" is located in the sector on the left from the goddess Nut (see Figure 3.15), right behind the zodiacal symbols annotated with Demotic inscriptions. An enlargement of this fragment is presented on Figure 8.7 (see also the color annotated Brugsch's zodiac on Figure 8.8, where it is placed on a light purple background). All the planetary symbols in this horoscope were already discussed section 5.4, which was devoted to the symbolism of the main horoscope. Let us recall the results of this analysis.

In the sector of Brugsch's zodiac occupied by the horoscope "Without Walking Sticks" there are shown the following scenes and symbols of the main horoscope (starting from the far left):

1. Stabbing of a Bull — a "bullfighting". See subsection 5.9.5;
2. Symbol of Venus — a lioness and a crocodile underneath. See subsection 5.4.8;
3. An ape sitting on its tail, which is curved into a circle — a supplementary symbol, probably related to Venus;
4. Symbol of the Sun — large bird. On the Egyptian zodiacs bird was used very often as a symbol of the Sun. See subsection 5.4.13;
5. Figure of Mercury – a man with a human head. See subsections 5.4.2, 5.4.3, and 5.4.9;
6. Figure of Jupiter – a man with monkey head. See subsections 5.4.2 and 5.4.6.
7. Figure of Saturn – a man with jackal head. See subsections 5.4.2 and 5.4.3.
8. Figure of Mars – a man with falcon head. See subsections 5.4.5 and 5.4.2.

By looking at the locations of these figures with respect to the symbols of the zodiacal constellations shown on the right in the central sector of the zodiac (see Figure 8.7), we obtain the following decoding of the horoscope "Without Walking Sticks":

The Horoscope "Without Walking Sticks" on Brugsch's Zodiac

SUN — in Leo or Libra;
MOON — not shown;
SATURN — in Scorpio;
MERCURY — in Libra or Scorpio. It is in Libra, but it is possible that the horoscope shows a cluster of the four planets: Mercury, Jupiter, Saturn, and Mars — in this case it would be in Scorpio;
MARS — in Sagittarius or Scorpio;
VENUS — in Leo or on the border of Leo and Virgo (a baboon);
JUPITER — in Libra or Scorpio.

The file with the exact data, that was used for the program HOROS, is included in Appendix **??**.

For this horoscope, we found only three solutions: the year 73 AD, 250 AD, and 1841 AD. Is not surprising to see here the date 1841, which is very close to the second solution for the Demotic horoscope.

In Table 8.8, we list the planetary positions on October 18, 1841 AD, expressed in degrees on the ecliptic J2000 and, in the next row below, we thee same locations specified using their coordinates on the constellation scale (see section 6.10).

Before making any conclusion about Brugsch's zodiac, we should look first for the solutions of the horoscope in "Boats."

8.2.3 Horoscope in "Boats" on Brugsch's Zodiac

The planets belonging to the horoscope in "Boats" are located in the sector on the right from the goddess Nut (see

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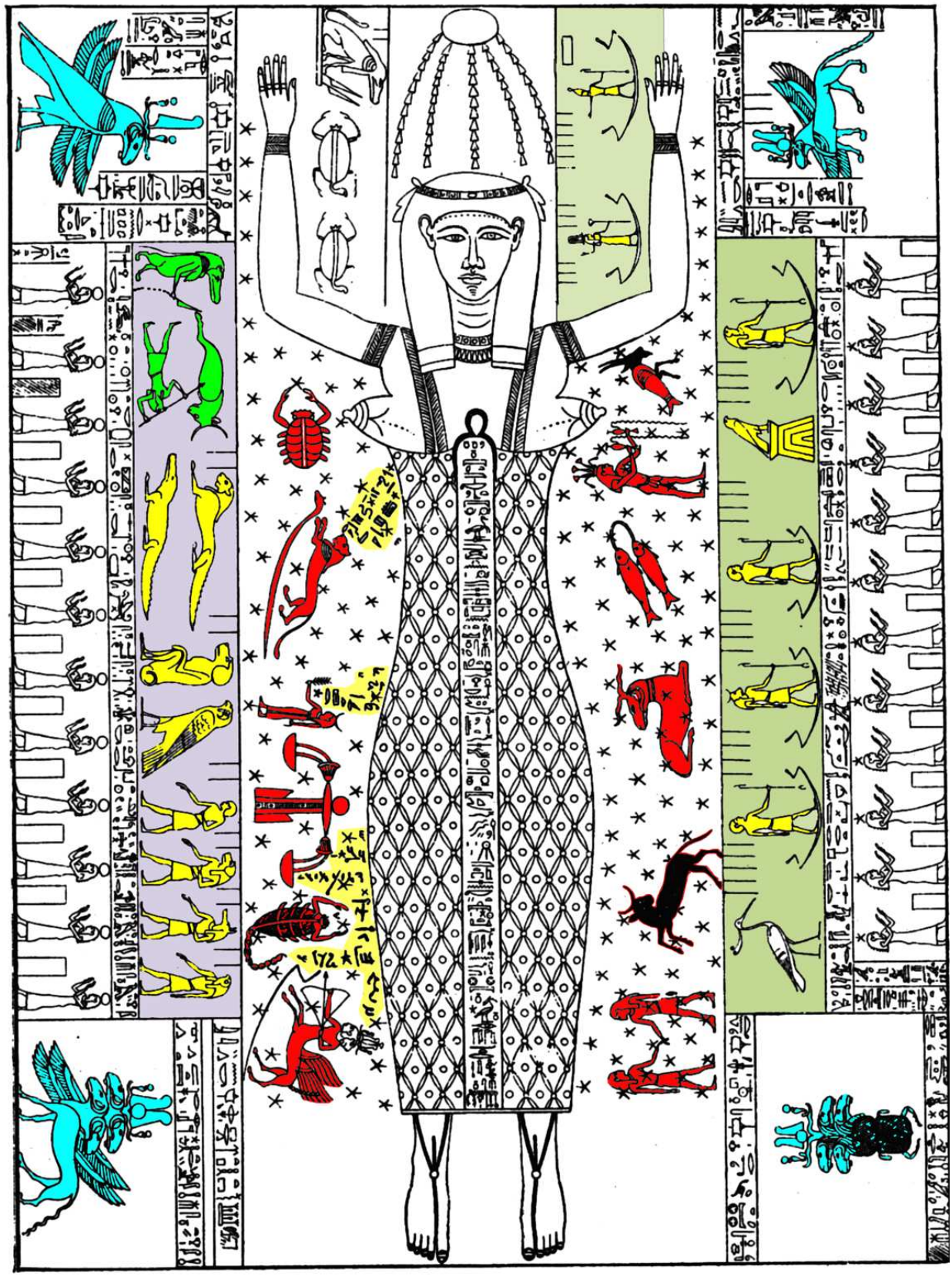

Figure 8.8: *Color annotated Brugsch's zodiac "BR". All the three horoscopes are marked in yellow.*

Figure 8.9: *Fragment of the Brugsch's zodiac containing the horoscope in "Boats."*

Horoscope without Walking Sticks **Julian day (JD) = 2393762.00** **Year/Month/Day = 1841/10/6**						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
207.2^o	254.1^o	270.5^o	259.4^o	271.1^o	174.5^o	229.9^o
5.80	7.58	8.11	7.76	8.13	5.00	6.69
Virgo	Scorpio	Sagitt	Scorpio	Sagitt	Vir/Leo	Libra
Mean Distance from the Best Points= 13.3^o (without Moon)						

Table 8.8: *Planetary Positions on October 6, 1841*

Figure 3.15). An enlargement of this fragment is presented on Figure 8.9. On the color annotated Brugsch's zodiac (see Figure 8.8) they are marked in yellow. On Figure 8.8. the horoscope in "Boats" is shown on a green-yellow background. Notice that these two horoscopes: without "Walking Sticks" and on "Boats," are arranged symmetrically on the opposite sites of the goddess Nut. Since their figures are clearly separated, there is no danger of confusing them with the wrong horoscope.

All the figures from the horoscope on "Boats" were already discussed in Chapter 5, where we have explained the principles for the identification of planets. Section 5.4 was devoted to the symbolism of the main horoscope on the Egyptian zodiacs. In this subsection we will only present the final results.

On the horoscope in "Boats" (see Figure 8.9), there are shown the following planets from the main horoscope (starting from the far left):

1. The first symbol in this sector is a figure of a tall bird with a long beak. This is probably a supplementary symbol, which does not represent any planet.
2. Mercury — a male figure with a human head standing on a boat with a planetary walking stick;
3. Saturn — a male figure with a head of a bull, with crescent-like horns, holding a walking stick;
4. Second figure of Mercury — it is exactly the same figure as the one that is standing on the other side of Saturn, which was identified as Mercury. That means, Mercury is shown here twice around Saturn, which may imply that Mercury was "passing" Saturn on these days.
5. Sun — a bird on a podium. A very similar bird, but without a podium, symbolized the Sun in the horoscope without "walking sticks," on the other side of the goddess Nut;
6. Mars — a male figure with a falcon head standing on a boat and holding a planetary walking stick;
7. Venus — a female figure on a boat, holding the usual walking stick. This figure is moved slightly away from the other symbols. It is placed over the forearm of the goddess Nut. The reason for this shifting could be the fact that Venus has already "moved" to the another half of the zodiac, which is located on the left side of the goddess Nut. In this case, it could signify that Venus was in Sagittarius, but we should not exclude the possibility that Venus was still in Capricorn.
8. Jupiter — a male figure with a high hat on his head, standing on a boat and holding a planetary walking stick. His arm is outstretched towards Venus. It is also located above the forearm of Nut.

By comparing the locations of these figures with respect to the zodiacal constellations in the central sector of the zodiac (see Figure 8.9), we get the following decoding of the horoscope in "Boats":

The Horoscope in "Boats"
on Brugsch's Zodiac

SUN — in Aquarius or Capricorn;
MOON — not shown;
SATURN — in Aries;
MERCURY — is shown twice: in Pisces and Taurus. It is "passing" Saturn;
MARS — in Capricorn;
VENUS — in Capricorn or Sagittarius, already in the another half of the zodiac;
JUPITER — in Capricorn or Sagittarius.

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The file containing the input data for the program HOROS, which is based on the above decoding, is included in Appendix **??**. There were two solutions found for this remarkable zodiac: the year 999 A.D. and 1853 A.D.

In this way we have arrived to a conclusion that the Brugsch's zodiac refers to the 19th century! There is no other way we could possibly explain the fact that the solutions of the three horoscopes gathered only once around practically the same date: 1841, 1853 and 1861. Moreover, the date of the Demotic zodiac, which was probably annotated later, it the most recent — the year 1861.

Let us point out that there are not many solutions for any of those horoscopes on the Brugsch zodiac — from one to three in the whole historical time interval. Therefore, the probability of having three random solutions ping-pointing the same date is extremely small. The fact that we were able to find such three solutions is a strong indication that the Brugsch's zodiac was indeed created in the second half of the 19th century.

The exact positions of the planets on February 27, 1853, which is our solution for the horoscope in "Boats," are presented in Table 8.9.

Horoscope in "Boats" **Julian day (JD) = 2397912.00** **Year/Month/Day = 1853/2/27**						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
340.9^o	210.2^o	45.0^o	263.9^o	333.9^o	321.7^o	341.9^o
10.67	5.87	0.74	7.91	10.25	9.72	10.73
Aquar	Virgo	Aries	Scorpio	Aqu/Capr	Capric	Aqu/Pisc
Mean Distance from the Best Points = 26.5^o **(without Moon)**						

Table 8.9: *Planetary Positions on February 27, 1853*

Let us describe the planetary configuration on the day of solution: February 27, 1853 A.D.

1. Mercury turned out to be in Aquarius. It was located just 5^o from the border with Pisces. Since the boundaries between zodiacal constellations are not precisely defined, we are allowing 5^o margin of tolerance for their locations (see section 6.4). From this point of view, the position of Mercury satisfies the conditions described in the horoscope in "Boats." On the other hand, a closer look on the location of Mercury in the horoscope in "Boats" (see Figure 8.9) allows us to suggest that Mercury in fact could be in Aquarius, near the border with Pisces. Let us point out that at Mercury was not visible at that time — it was too close to the Sun. The configuration of the Sun, Mercury, Mars and Venus, on the sky on February 27, 1857, is shown on Figure 8.10.

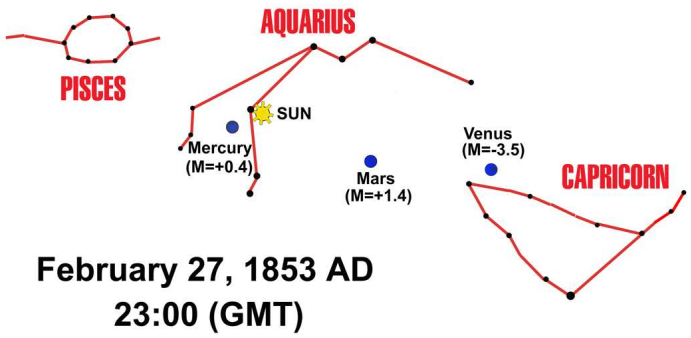

Figure 8.10: *Configuration of the planets in the surroundings of the constellation of Aquarius on February 27, 1853 A.D.*

2. The obtained results suggest that the second figure of Mercury, located on the left from Saturn, is not included in the horoscope. Nevertheless, there is some astronomical meaning associated with it. The most probably it symbolizes the "meeting" between Mercury and Saturn, which indeed took place on May 30, 1853. At that time the distance between Saturn and Mercury was only $\frac{1}{7}2^o$ and the both planets were well visible in Cairo before the dawn. When Mercury and Saturn were rising above the horizon, the submersion of the Sun was $SUH = 9^o$–10^o and their brightness was high ($M = +0.2$), which wis comparable with the brightness of the first magnitude stars. Consequently, these two planets could be observed clearly, one next to another, on the sill dark sky before the sunrise.
3. The mean discrepancy from the best points turned out to be relatively large — about 27^o. However, it is still acceptable. Let us recall that the average precision of an Egyptian zodiac is not higher than 15^o — i.e. one half of the length of an average zodiacal constellation. Therefore, the mean discrepancy from the best points can sometimes reach 20^o or even 30^o. In such a case, we can say that the zodiac's design was not very accurate. Of course, the precision of some Egyptian zodiacs could vary remarkably.

For the sake of completeness, we present in Table 8.10 the planetary positions for the second solution for the horoscope in "Boats:" February 14, 999 AD.

It is clear that this solution fits better the arrangement of the planetary symbols in the horoscope in "Boats" on Brugsch's zodiac, but its date is too faraway in time from the solutions of the other two horoscopes. The time difference is more than 600 years. For the burial horoscopes found on the cover of a single sarcophagus, such a time interval is definitely unacceptable. The dates shown in these horoscopes should be close one to another, so they could be related in some way to the occupant of that tomb. In this situation, we have no other choice than just to accept the solution pointing to the year 1853. Notice that this solution also completely agrees with the horoscope in "Boats."

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Horoscope in "Boats" Julian day (JD) = 2085987.00 Year/Month/Day = 999/2/14						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
344.9^o	289.1^o	49.0^o	265.7^o	322.6^o	301.6^o	0.4^o
10.67	5.87	0.74	7.91	10.25	9.72	10.73
Aqu/Pisc	Sagit	Aries	Sco/Sag	Capric	Cap/Sag	Aqu/Pisc
Mean Distance from the Best Points = 13.5^o (without Moon)						

Table 8.10: *Planetary Positions on February 14, 999*

Now it becomes clear, why in the both horoscopes without "Walking Sticks" and in "Boats," which are the parts of the original design of the zodiac (in contrast to the annotated later Demotic horoscope), there is no Moon. If indeed, this zodiac was created in the 19th century, at that time it was already a common knowledge that Moon is not a planet, but just a satellite of the Earth. In the ancient astronomy, Moon was considered as a planet and it was always included in ancient Egyptian zodiacs. However, on the 19th century zodiac, Moon could be simply "omitted" from its design.

8.2.4 Conclusions

In this way we are forced to admit that Brugsch's zodiac was created in the second half of the 19th century. It was not long before the zodiac was shown to Henry Brugsch, who in good faith accepted it as an ancient Egyptian funerary relic. The Demotic inscriptions were probably made on the zodiac just before it was presented to Brugsch. Ironically, it seems that the date of the Demotic horoscope was calculated to be few years in advance. In 19th century, astronomical tables were widely available so such information could be easily obtained. On the other hand, the "ancient" Demotic inscription could be copied, for example, from Henri Brugsch's or other Egyptologists' works.

By the way, many of the so-called "ancient" Egyptian sarcophagi, very similar to the one found by Henri Brugsch, are displayed in almost every major museum. However, only in exceptional cases the interior sides of the covers are shown to the public. Incidentally, the inside on the coffin's cover was the place, where the funeral horoscopes were usually painted. No need to say that each of those horoscopes encodes a date that can be deciphered, so their true age could be determined. Unfortunately, the horoscopes are hidden from the public view. Maybe somebody realized how important this information could be, and in order to prevent questioning the Scaliger version of the chronology and protecting the quiet life of Egyptologists, the horoscopes are safeguarded outside the public view.

8.3 Zodiac of Ramses VII —"Color Thebes Zodiac"

In this section we will analyze the Color Thebes zodiac, which we denote by the symbol (OU). This zodiac was discovered in the Valley of the Kings by the members of the Napoleonic expedition. It was a color mural, painted on the ceiling inside the tomb. A color drawing of this zodiac was published in the famous Napoleonic Album[7] (see Figure 2.3 or the same picture enlarged on Figure 8.11), where it is described as "*Tableau astronomique peint au plafond du 1-er tombeau de Rois à l'Ouest*. This reproduction of the Color Thebes zodiac was used in our analysis.

In Chapter 7 (see section 7.1), we have described the gigantic burial complex located in the Valley of the Kings, where the Color Thebes zodiac was discovered. Let us recall that the temples in Denderah and Esna were also located not far from this valley. The dates of the zodiacs found in these temples pointed out to the epoch between the 12th and 15th centuries. It is very interesting to find out what date is encoded in the Thebes zodiac. This date could provide us with important clues related to the real age of the burial grounds in the Valley of the Kings. Of course, it is also a question if this date would be compatible with the dates of the other zodiacs from Denderah and Esna.

We are not aware of any previous attempt of astronomical dating of the Color Thebes zodiac. It seems to us that we are the first who analyzed it from the astronomical point of view and used the obtained information to compute the date shown on this zodiac.

The Color Thebes zodiac is composed of two symmetric parts. In each half of the zodiac, there is a sequence of figures, arranged in a row, which is surrounded from the inside by the goddess Nut (see Figure 8.11). Notice that the figures shown in the right half of the zodiac have small discs over their heads. In order to distinguish between these two parts, we will call the part with these small discs (which on Figure 8.11 is shown on the right hand side) — the *upper half*, while the other part (it is the left hand side on Figure 8.11) will be called the *lower half* of the Thebes zodiac. As we are going to explain it in a moment, it turns out that the main horoscope on this zodiac is located in the central section of the lower half. The upper half does not seem to contain any additional information for the main horoscope. In its central area, it shows a familiar scene of "killing the bull" (a "bullfighting"), which was already discussed in subsection 5.9.5. There is also a repetition of some elements of the horoscope from the lower half.

8.3.1 Constellation Figures on the Thebes Zodiac

There is a cluster of figures located in the central area of the lower half of the zodiac. Among these figures we can easily rec-

[7] See [2], plate 82.

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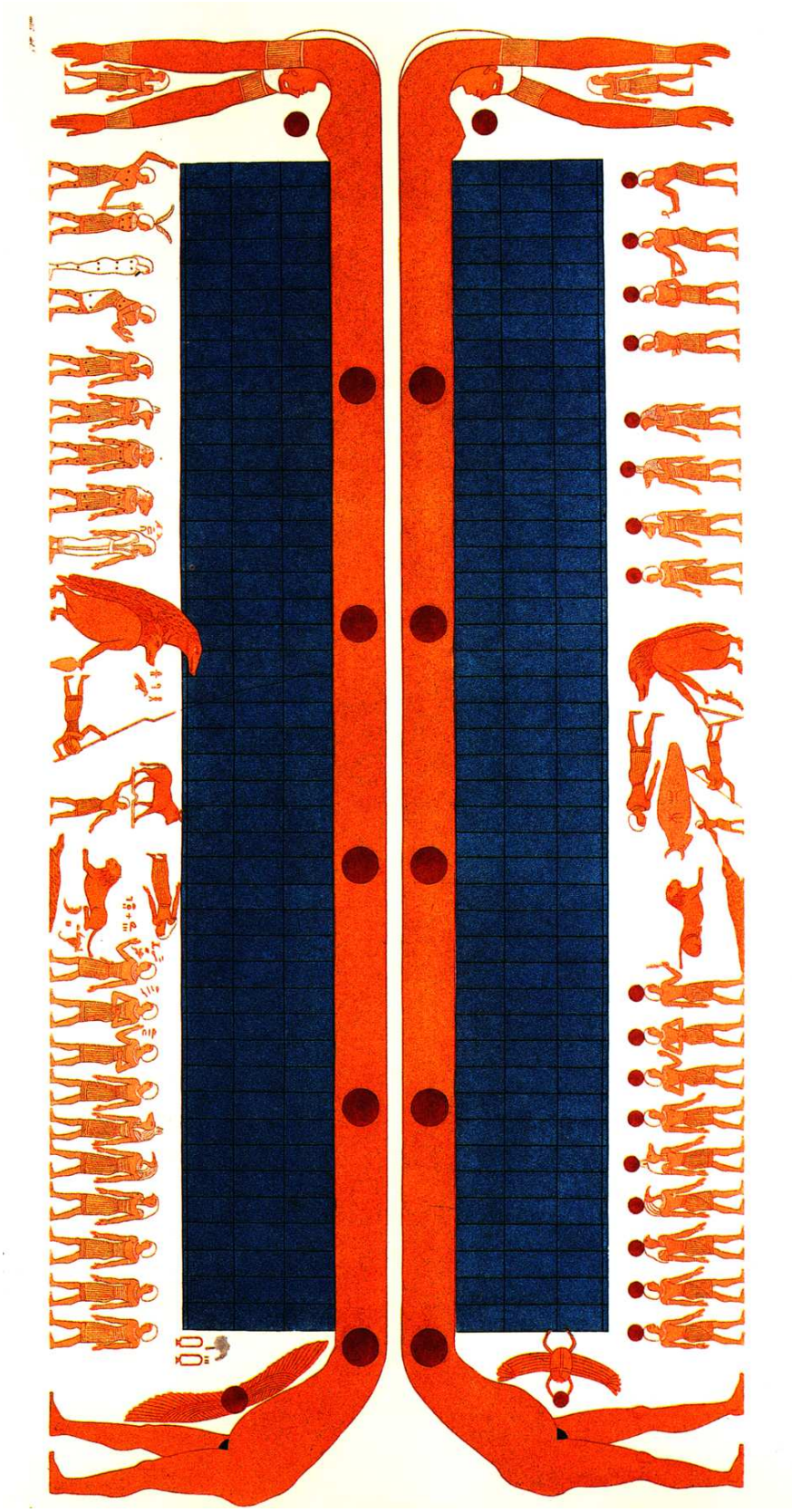

Figure 8.11: *The Color Thebes Zodiac.*

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ognize those which represent the constellations of Leo, Scorpio and Taurus. Notice that very similar symbols were used for the zodiacal constellations on the other Egyptian zodiacs. Leo is shown as a figure of a lion lying down on its stomach with the tail stretched out away from its body. Right under its tail, there is a small figure of Scorpio. The both symbols are easy to identify. In front of the lion's head there is a standing male figure with a raised up hand holding a large tray. On the tray, there is a standing figure of a bull — Taurus. Those are the only three zodiacal figures that can be identified in this section of the Thebes zodiac. It seems that the remaining nine other zodiacal figures are not present on this zodiac. In fact, there is not even one familiar figure, which could be considered as a zodiacal constellation. We have to acknowledge that these figures are not present here, or maybe, some other symbols are used to replace them.

Indeed, the remaining nine zodiacal constellations, although they are not important for the astronomical dating, there are in fact present on the Color Thebes zodiac. They are represented in very unusual for the Egyptian zodiacs way. Notice the nine human figures standing on the left hand side from the center in the lower half of the zodiac. Among those figures, we can easily recognize one female figure. The bodies of all the male figures are covered with small dots. If we think about the shapes of the constellations, which appear on the sky filled with small shining dots — the stars, we realize that these figures could represent the remaining nine zodiacal constellations of Libra, Sagittarius, Capricorn, Aquarius, Pisces, Aries, Gemini, Cancer and Virgo. Moreover, the female figure could very well symbolize Virgo. Nevertheless, as we already stated it earlier, this identification of the "constellation sequence" is not important at all for the astronomical dating. There are no additional planetary figures shown among these nine constellations, so there is no additional information that could be useful for the dating.

8.3.2 Planetary Figures on the Thebes Zodiac

Let us proceed to the identification of planetary symbols on the Thebes zodiac. These figures should be located among the symbols of constellations. In a meaningful design of a horoscope, the figures representing the planets can not be too much apart from the constellations, so a spacial relation between them could be established. Consequently, we should look for the planets in the area already occupied by the identified above constellations of Leo, Scorpio and Taurus. Indeed, among the nine figures, which represent the remaining constellations, there are no additional symbols at all, except a small hieroglyphic inscription near the female's figure head. This inscription could simply be an indication that it is a symbol of Virgo (see Figure 8.11). On the other hand, several additional symbols can indeed be found among these three "standing out" constellations of Leo, Scorpio and Taurus.

First of all, we notice three male figures standing right behind the lions tail in the lower half of the zodiac. The hands of all the three figures express some gestures, and there are small hieroglyphic inscriptions placed next to their heads. These figures are followed by seven other male figures, but there is nothing distinctive about them. They hold the hands to their sides and one find no more inscriptions among them. This scene is clearly showing to us that the first three men are trying to "say" something, while the all others are "saying" nothing. The hieroglyphic inscriptions near the three leading figures contain probably their messages. Maybe, they are simply the names of these male planets. So, it is indeed a symbolic representation of a horoscope. We can deduct from it, that in Leo or near by, for example in Virgo, there were three male planets. In addition, we can guess that the hieroglyphic annotations, next to these planetary figures, were their actual names. This is also an important indication for us, that when looking for the other planetary symbols, we should pay a particular attention to occurrence of inscriptions accompanying these symbols.

There is no problem in recognizing the only female figure in this area of the Thebes zodiac. This figure, which is located over figure of lion, definitely represents Venus. Notice that there is something particular about its location. Although it is close to Leo, it was moved away from the other three male planets. Venus appears hovering over Leo in a location, which was shifted forward with respect to the three other male planets. In this moment it is impossible to figure out the exact meaning of this scene, but we should remember that for the previously analyzed Egyptian zodiacs, the computed final solutions provided us with convincing explanations of similar astronomical scenes. Thus in this case, we will also expect that the final solution will help us to clarify the interpretation of this astronomical picture.

The appearance of Venus in Leo can be also confirmed by another symbol — a crocodile, which is located under the figure of lion. A similar pair of symbols was also present on Brugsch's zodiac, in the horoscope without "the Walking Sticks," where it was identified as a symbol of Venus in Leo. Therefore, we can assume that they have the same meaning as on the Thebes zodiac.

One of our most important claims related to the symbolism of the Egyptian zodiacs, is that it always follows the same set of rules. The correctness of this postulate was confirmed by our success in finding the unique and full solutions for all the studied Egyptian zodiacs. It turned out that these zodiacs were using the same astronomical conventions. Since an astronomical object can be shown in many ways, the symbolic language of zodiacs is rather complex. Nevertheless, closely similar symbols on two different Egyptian zodiacs always carried the same meaning.

Consequently, we can conclude that on the Color Thebes zodiac, Venus is shown in Leo. Besides Venus, in Leo or Virgo, but not far from Leo, there were three other planets. Let us discuss shortly, what possibly these planets could be.

Let us look again at the figures standing behind the lion in the lower half of the zodiac. This sequence is stretching almost to the right end of the zodiac. As we have noticed it earlier, this procession is led by three male figures. Each of them has a hieroglyphic inscription next it. They are followed by another male figure without particular attributes, with hands on its sides and with no inscriptions around. The procession is closed by three other completely identical figures. It is not clear what could be their meaning, but the lack of any distinctiveness among them may suggest that their role is probably to fill the empty space on the zodiac. It is possible, they are simply an entourage of the main planetary symbols. If we exclude these four figures, then besides the planetary symbols (three leading figures with inscriptions) there are three male figures with the usual for Egyptian zodiacs planetary attributes. The first of these figures has a jackal head, the second has an ibis head (a bird with a long curved down beak), and the third one has a falcon head. We have discussed these attributes in subsections 5.4.2, 5.4.3, 5.4.4, and 5.4.7. The jackal or ibis head are typical symbols for Mercury or Saturn. For example, on the Small Esna zodiac, Saturn was represented by a figure with ibis head, and on the Big Esna zodiac, Mercury was shown with jackal head (see the related to these issues discussion in subsection 5.4.3). On the other hand, the falcon head is an attribute of Mars frequently used on the Egyptian zodiacs (see subsection 5.4.7). In this way, in Leo or in Virgo but close to the Leo's tail, there are shown Mercury, Saturn and Mars. Let us point out that in the case of the Thebes zodiac, a possible mixup of Mercury and Saturn, because of their similar symbolism (see subsection 5.4.4), does not create additional problems. These two planets are shown together in the same constellation — in Leo.

At this moment we only need to locate the remaining three planets: the Sun, Moon and Jupiter. Right under the lion, which represents Leo, there is a symbol of Scorpio. The presence of Scorpio in this area of the Thebes zodiac is an indication that there was indeed another planet (or possibly planets) in this constellation. The design of the Thebes zodiac was based on the idea of displaying only those constellations that contained some of the planets. All the other constellations, without any planet inside, were shown in a very simplified way (or simply omitted). Consequently, we expect that near Scorpio there should be a symbol of another planet. Indeed, right next to it, there is a small hieroglyphic inscription that looks like two dots, which is followed by a symbol of a small crescent. This is clearly a symbol of a half-moon. The location of this half-moon and its relatively small size with respect to the figure of Scorpio (but not to Leo), indisputably hints that Moon, in its half-moon stage, was located in Scorpio. A more precise examination of this symbol reveals that in fact it is not exactly a half-moon, but a lizard shaped in a form of a half-moon. In this way, we obtain that Moon on the Thebes zodiac is shown in Scorpio.

Since the most of the planets are already located, it is not very complicated to find the Sun and Jupiter. Again, the presence of Taurus, in this area of the zodiac, indicates again that either the Sun or Jupiter was there. But it is impossible, because of purely astronomical reasons, that the Sun was in Taurus. Notice that Mercury and Venus were already identified in Leo, which is two constellations further from Taurus — a distance of about 50^o. Since Mercury and Venus are never getting so far away from the Sun, the Sun could not be in Taurus at that time. Consequently, Jupiter was in Taurus. It is shown on the Thebes zodiac as a male figure holding high above his head a tray with a bull. The corresponding to Jupiter inscription is located on the same level as the bull, noticeably to the left, just in front of the two fantastic figures separating the area of the main horoscope from the "constellation sequence." This inscription consists of three hieroglyphs and a bird underneath.

Finally, we need to localize the Sun. It is easy to notice that there is only one more inscription on the zodiac. It consists of several hieroglyphs and a small figure of bird, which are located near the head of a female figure at the right end of the "constellation sequence" (see Figure 5.51). We recognized this sequence of figures, which are filled with small dots, as the symbols of "empty" zodiacal constellations. The only female symbol in this sequence was identified as Virgo. In this way, we obtain that the Sun was in Virgo. For some reasons, Virgo was moved into the group of the sequence of "empty constellations," instead of being included in the area of the main horoscope. However, the female figure representing Virgo is not filled with small dots, as the all other figures in the "constellation sequence," and it stands clearly out of this sequence. On the other hand, the position of the Sun in Virgo, is compatible with the locations of Venus and Mercury in Leo. The other variants for the location of the Sun — in Leo or Cancer, were not confirmed by the results of the computations, and consequently, were rejected. In addition, on the Color Thebes zodiac, there is another indication that the Sun was in Virgo, or not far from it. If we look carefully on the figure representing Taurus, we realize that its elevated position on a tray may symbolize that at that time the constellation of Taurus was in its culmination point, i.e. it reached its highest altitude on the sky. It was already explained in section 5.4.13, that the culmination of Taurus means that the Sun was on the opposite side of the ecliptic, in either one of the constellations of Virgo, Libra, Scorpio, or Sagittarius. However, it could not be neither in Cancer or Leo. In summary, we can conclude that on the Color Thebes zodiac, the Sun is shown in Virgo.

8.3.3 The Main Horoscope and Additional Conditions

Since we have found all the planets — the Sun, Moon, Mercury, Saturn and Jupiter, we can complete the decoding of the Color Thebes zodiac. All the planets were accompanied by hieroglyphic inscriptions, which allowed us to recognized them without too much trouble. There were exactly seven inscriptions corresponding to the seven planets. It turned out that the main horoscope was located in the central part of the lower half of the Thebes zodiac. The upper half does not

contain any hieroglyphic inscription. The figures and the symbols in the upper half of the zodiac basically repeat the same scenes that are in the lower half. For example, Mercury, Saturn and Mars are shown there in the symmetric position to the figures of Mercury, Saturn and Mars in the lower half. There are symbolized by exactly the same male figures with similar hand gestures, but only without any inscription. Venus in the upper half is represented simply by the pair of lion and crocodile, without additional female figure. Jupiter is shown as a male figure with only one hand standing next to Taurus represented by a rather "exotic" symbol. The lizard symbolizing Moon, was moved under a paw of the fantastic animal separating this area from the "constellation sequence." The Sun is not present here, neither the constellation of Virgo, where it was located in the lower half. However, in general, there is a clear correspondence between the symbols of the upper and lower halves of the zodiac. Thus, there is nothing essentially new in the upper half that could provide us with additional information. In this way we have to use for the astronomical dating only the main horoscope, which we were able to decode completely.

The Main Horoscope
on the Color Thebes Zodiac

SUN — in Virgo;
Moon — in Scorpio;
Mercury, Saturn, Mars, and Venus — in Leo, or in Virgo close to the border with Leo, i.e. near the "tail of Leo;"
Jupiter — in Taurus.

There is almost no additional astronomical information on the Thebes zodiac. There are no partial horoscopes or visibility attributes on this zodiac. The order of planets can not be determined completely in a unique way. The supplementary scene of "killing the bull" (or "bullfighting") can not be helpful for the selection of solutions. Nevertheless, there is still some supplementary information that can be extracted from the Thebes zodiac. Namely:

1. The three planets — Mercury, Mars and Saturn, are shown in a one cluster clearly separated from Venus. In this way, we should expect that in an astronomical solution all these three planets should appear as a group located in one row, and Venus should be clearly separated from these three planets.
2. The design on the Thebes zodiac strongly suggests that Venus was not aligned with the other planets, what is indicated by its position outside the row containing the other planetary symbols. From the astronomical point of view, it probably means that Venus drifted significantly from the ecliptic, while in the same time all the other planets were very close to the ecliptic. In this way, Venus appeared on the side of the direction followed by the other planets.

So, there is not really much additional information that could be useful for the verification of solutions for the Thebes zodiac. We were able to formulate only two supplementary conditions for this purpose. In this way, there are very weak chances of finding a unique solution for this zodiac. The input file for the program HOROS, which we used for these calculations, is included in Appendix **??**. As before, we have applied the usual restrictions of the computed preliminary solutions. The obtained results are discussed in the next subsection.

8.3.4 Preliminary Solutions for the Main Horoscope

Our astronomical computations proved that there are very few solutions for the Color Thebes zodiac in the historical time interval from the year 500 B.C. till 1900 A.D. We have found only three such solutions:

- (i) August 16, −349 (i.e. 350 B.C.);
- (ii) August 30, 268 A.D.;
- (iii) September 6, 1182 A.D.

For simplicity, we included in the above list only one date for each solution. In fact, there were two or even three days around each of these days, which still could be considered as preliminary solutions as well. We will also relax our convention of using the "Anno Domini" and "Before Christ" years, and instead we will adopt the so-called "astronomical system" of counting the years. More precisely, we will assume that there is the *zero year* of our era, which correspond to the year 1 B.C. In the so-called "historical system" of counting the years, there is no year zero. Our era starts right from the year 1 A.D. In this way, in order to convert a date n B.C. from the "historical system" to the "astronomical system" we simply need to write it as the year $-n+1$. For example, the year 350 B.C. will correspond to the year −349 in the "astronomical system." Of course, in usual books only "historical system" is used. However, in books dealing with the astronomical computations, the "astronomical system" of counting the years is used instead. That can lead to some confusion, in particular when using computer programs for the astronomical computations. For example, the program Turbo-Sky, which we were using for the verification of our results presented in this book, applies the "historical system." That means, the date −350 denotes in this program the year 350 B.C., so it is the year −349 according to the "astronomical system." Therefore, before using a computer software for the verification of the solutions, we would like to advice our readers to check out in advance what kind of system it uses — the "historical" or "astronomical." This can be done very easily; just try to assign a date corresponding to the year zero and if the program will also display it in the same form, the "astronomical system" is used. Otherwise, it would be the "historical system" of counting the years. In this book, we were using the "astronomical system" for all the computations. For example the program HOROS is also using this system.

Let us return to the Color Thebes zodiac. We have found only three preliminary solutions in the historical interval from the year 500 B.C. till 1900 A.D., which were the years: −349, 268, and 1182. Clearly, with such a small number of preliminary solutions we can expect there is a good chance to identify a unique final solution for this zodiac. Let us emphasize

that all these three solutions are only preliminary solutions. They were not yet scrutinized with respect to the additional requirements. Only those solutions, which satisfy all the requirements will be considered as the final solutions. In the case there is only one final solution, we will obtain that the date shown on the Thebes zodiac is unique. Indeed, we will find out in a moment, that for the Color Thebes zodiac there is only one final solutions, which is September 5–8, 1182 A.D.

First of all, let us show the exact positions of the planets on the ecliptic J2000, for all three preliminary solutions (see Table 8.11). For each of these dates, we indicate in degrees the positions of the planets on the ecliptic J2000 as well as their locations using the coordinates on the constellation scale (see section 6.10). Finally, for each of the listed planets we specify its corresponding zodiacal constellation. For example, an abbreviation Sag/Scor means that the corresponding planet was located near the border between Sagittarius and Scorpio.

Julian day (JD) = 1593813.00 THEBES ZODIAC Year/Month/Day = 999/2/14						
Sun	Moon	Jupiter	Venus	Saturn	Mars	Mercury
170.0^o	267.0^o	58.0^o	143.0^o	160.0^o	160.0^o	163.0^o
4.8	8.0	1.2	4.0	4.5	4.5	4.6
Leo/Vir	Sag/Sco	Taurus	Can/Leo	Leo	Leo	Leo
Julian day (JD) = 1819187.00 THEBES ZODIAC Year/Month/Day = 268/8/30						
180.7^o	247.2^o	64.5^o	141.8^o	148.8^o	168.0^o	176.7^o
5.15	7.35	1.34	3.93	4.17	4.79	5.05
Virgo	Scorpio	Taurus	Can/Leo	Leo	Leo	Vir/Leo
Julian day (JD) = 2153032.00 THEBES ZODIAC Year/Month/Day = 1182/9/6						
Sun	Moon	Jupiter	Venus	Saturn	Mars	Mercury
181.4^o	258.3^o	86.4^o	151.2^o	170.2^o	169.8^o	173.2^o
5.17	7.72	1.92	4.25	4.86	4.85	4.96
Virgo	Scorpio	Taurus	Leo	Leo	Leo	Vir/Leo

Table 8.11: *Preliminary solutions for Thebes Zodiac*

In the next step we will verify which of these solutions satisfies the additional conditions, which were formulated in subsection 8.3.3. Let us recall them:

1. Mercury, Mars and Saturn should be located in one row on the ecliptic. Venus should appear outside this group of three planets.
2. Venus should not be aligned with the other planets, but it should be on the side of the direction followed by the other planets.

8.3.5 Checking the Supplementary Conditions

Let us consider the first solution: August 16, -349 (i.e. 350 B.C. — according to the "historical system"). On Figure 8.12, we show the positions of the planets in morning on that day, the way they were observed from Luxor. At the moment Mercury was rising above the horizon, when the submersion of the Sun was $SUH = 7^o$. The other planets — Venus, Saturn and Mars, were already above the horizon. At the time of their rising, the sky was still dark, so, they were very well visible. The brightness of Mercury was $M = +0.2$, so possibly it was also visible from Luxor. It turns out that the location of an observer is important for the visibility of Mercury, since in Cairo it was not visible on that day (Mercury was rising in Cairo with the submersion of the Sun 5^o). We refer the reader to section 5.11 for more details on conditions of visibility.

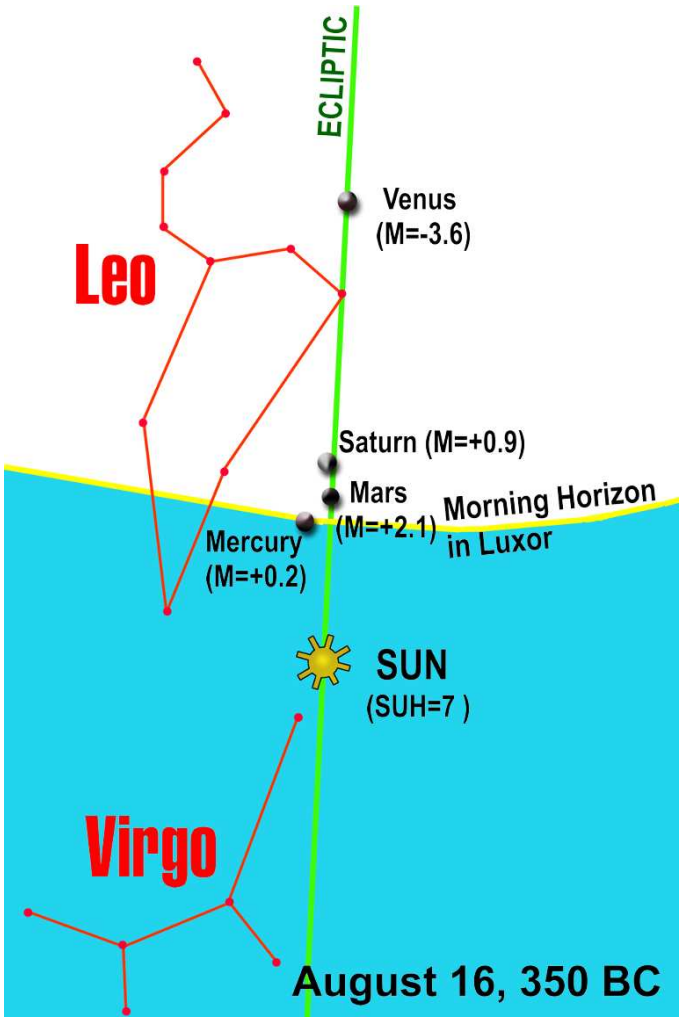

Figure 8.12: *Planets around the Sun on August 16, 350 B.C.*

The solution: August 16, −349, does not satisfy all the conditions specified for the Thebes zodiac. As a matter of fact,

the Sun that was supposed to be in Virgo, is on the border of Leo. It will reach Virgo only after few days. Notice that on the Thebes zodiac, the location of the Sun was indicated in Virgo. Since the figure of Leo is present on the zodiac, and the Sun is not marked there, we have to assume that the Sun was not in Leo.

Let us now check if the supplementary conditions are satisfied by this solution. The first condition that Mercury, Mars and Saturn should be located on the line on the ecliptic, is indeed satisfied (see Figure 8.12). However, the second condition that Venus is not aligned with Mercury, Mars and Saturn, is not fulfilled. Venus is located exactly on the ecliptic, as well as all the other planets. There is no reason why we should consider Venus to be located here outside the line showing the general direction of the motion of the other planets. Notice that the position of Venus on the Thebes zodiac is undoubtedly shifted to a side from the row containing the other planetary symbols. Consequently, we reject this preliminary solution as incompatible with the second supplementary condition. Let us point out, that this solution was much too early, even from the point of view of Scaliger's chronology. According to this chronology, there were no "Greeko-Roman" zodiacs in Egypt before the 2nd century B.C. (see our discussion of this issue in Chapter 2), but on the Thebes zodiac there are such "Greeko-Roman" symbols of zodiacal constellations of Leo, Scorpio and Taurus.

Let us now discuss the second solution: August 30, 268 A.D. It follows immediately from Table 8.11, that this solution does not satisfy the first supplementary condition. Since Venus is located in between Saturn and Mercury, it can not be considered to be apart from the group of planets containing Saturn, Mercury and Mars. Moreover, we have the following order of planets in this solution: Saturn, Venus, Mercury, Mars and the Sun. It is clear that this configuration does not agree with the situation shown on the Color Thebes zodiac, where Venus is clearly separated from the other planets. Therefore, this solution should be rejected as well.

The last preliminary solution — September 5–8, 1182 A.D., satisfies perfectly all the conditions specified for the Thebes zodiac. Although, the best correspondence with the zodiac occured on September 6–7, 1182, the dates September 5, and September 8, 1182, can also be accepted as satisfying all the requested requirements. Therefore, the final solution for the Color Thebes zodiac is September 5–8, 1182 A.D..

The positions of the planets near the Sun in the morning on September 6, 1182 A.D., are presented in Figure 8.13. We have chosen Luxor as the location for an observer. It is clear that on that day the Sun was indeed in Virgo, as it is shown on the Thebes zodiac. Mercury, Mars and Saturn, as it is required, were in Leo (see Figure 8.13). Venus at that time was at the end of Leo, almost on the border between Leo and Virgo, and its position is shifted to a side from the ecliptic. It is definitely not aligned with the other planets, which are very close to the ecliptic — not more than 1^o. The distance from Venus to the ecliptic is around 5^o. Of course, this configuration is a perfect match with the situation shown on the zodiac.

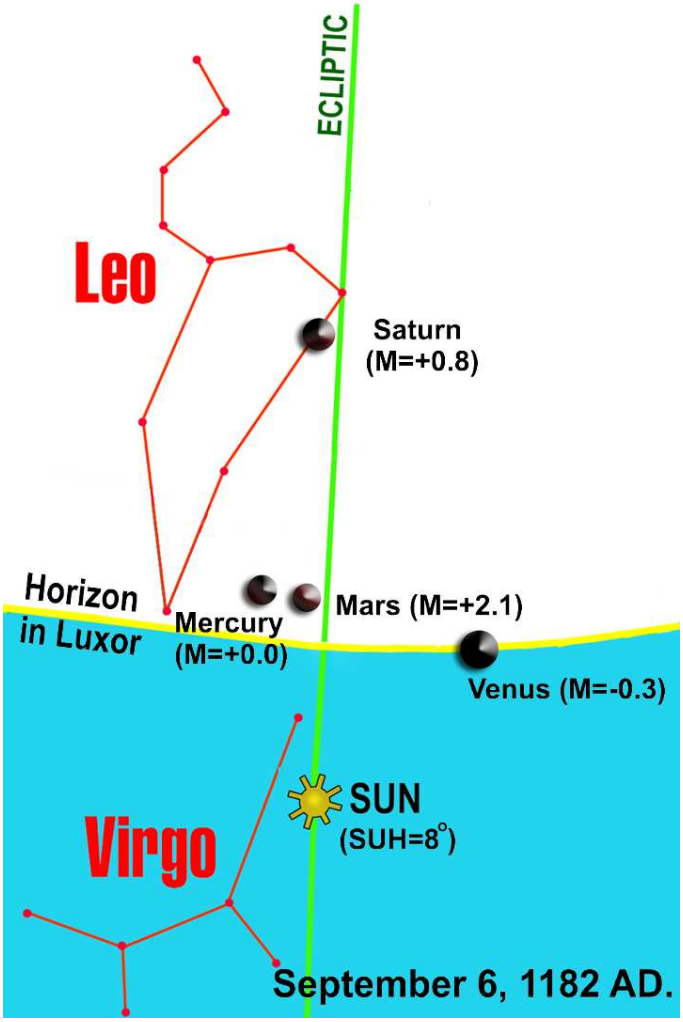

Figure 8.13: *Planets around the Sun in the morning on September 6, 1182 AD.*

Let us summarize our observations about the solution: September 5–8, 1182 A.D.

1. The first supplementary condition is satisfied, because Venus is clearly outside the group of three planets — Mercury, Saturn and Mars. It is slightly shifted towards Virgo.
2. The second supplementary condition is also satisfied. Venus is definitely located outside the ecliptic, which is the direction followed by all the other planets in this area.

Consequently, we can confirm that the solution — September 6, 1182 A.D., is in a perfect agreement with the Color Thebes zodiac.

8.3.6 Conclusion: the Date Encoded in the Color Zodiac was September 5–8, 1182 AD

In this way we are in the position to make a claim that the "ancient" Egyptians encoded on the Color Thebes zodiac the date: September 5–8, 1182 A.D. Notice that this date falls into the same epoch as the dates shown on the Denderah zodiacs. In fact, this date is right in-between the dates of the Long and the Round Denderah zodiacs.

The following question arises: what important occurences of the 12th century are reflected in these remains of the Egyptian tradition. Possibly, at that time some significant events took place. Since they were commemorated on the ceilings of large Egyptian temples, these events could be of religious nature. Still, the dates, which were decoded from the zodiacs, could be much older than the actual zodiacs. Consequently, the "ancient" authors of these zodiac could made their creations not earlier than at the end of the 12th century, but the most probably, even much later.

By the way, our solution for the Thebes zodiac coincides with one important Christian holiday — Nativity of the Virgin Mary. This festival is celebrated by the Orthodox Church on September 8 according to Julian calendar. It is possible that it is just a coincidence, but in this royal tomb, which was located in the Valley of the Kings, could be commemorated a Christian festival. After seeing so many revelations about the "ancient" Egypt, this could be not so strange.

8.4 Two Zodiacs from the Petosiris Tomb

In this section we will analyze for the purpose of the astronomical dating the two "ancient" Egyptian burial zodiacs found in the Petosiris tomb. The photographs of these zodiacs were published in [5]. They were painted on the ceilings of the inner and the outer chambers inside the tomb. Let us recall (see section 2.5) that we denote by (P1) the zodiac from the outer room and by (P2) the zodiac from the inner room. Since these two zodiacs were well preserved, there is a good chance to discover the exact age of the Petosiris tomb. Of course, this date could be another important milestone in establishing the most probable chronology for history of Ancient Egypt.

We will explain later in this section how it was possible to compute the dates encoded in the Petosiris zodiacs. Right now, let us present the final results of our computations. It turned out, that because of the absence of the additional astronomical information (eg. partial horoscopes or supplementary scenes), it was impossible to obtain unique solutions for these two zodiacs. Nevertheless, there were only three admissible pairs of solutions found: two medieval pairs and the one that seemed to us the most probable, in the 17th and 18th centuries. These exact dates are as follows:

First Variant: August 5, 1227 AD, for the outer room zodiac (P1), and March 24–25, 1240 AD, for the inner room zodiac (P2). We can not exclude the possibility that the Petosiris tomb was built in the 13th century. However, in this case, the buried in the tomb person was only 13 years old ($1227 - 1240 = 13$), but we do not find on the walls of the tomb any picture showing a young teenager, circumstances of his death, or anything related to his burial (see [5]). On the other hand there is a scene showing the killing of an adult man with a beard. His body is pierced with arrows, while he is kneeing with one hand raised up. Right above this scene there is a painting of a mummified body (see Figures 8.14 and 8.18). Therefore, it seems that the man buried in the Petosiris tomb was a warrior killed in a battle and he was definitely older than 13. Nevertheless, we will consider this solutions as possible even if it is very improbable.

Second Variant: August 10, 1430 A.D. for the outer room zodiac (P1), and April 17, 1477 A.D. for the inner room zodiac. Let us point out that this solution does not completely agree with the inner room zodiac (P2). However its flaws are rather minimal, so this pair of solutions should also be taken into account. Notice that according to the obtained dates, the age of the buried man was 47 years. From this point of view, the obtained solutions correspond well to the scenes painted on the tombs walls (see Figures 8.14 and 8.18).

Third Variant: August 2, 1667 AD for the outer room zodiac (P1), and April 2, 1714 A.D. for the inner room zodiac. The age of the man buried in the tomb would be 47 years in this case. Notice that these dates are rather late. It is already the 18th century! Nevertheless, these two dates are the most probable solutions for the Petosiris zodiac. Indeed, in our opinion the design of the tomb looks more like the 18th century style than the 13th century creation. Moreover, at that time in the 18th century, Egypt was ruled again by Mameluks, who regain the control of Egypt from the Ottoman Empire (see [53], p. 745). It is possible that the Petosiris tomb was a Mameluk burial place from this epoch. After the eradication of the Mameluks in the year 1811 (see [53], p. 745), as a form of a deception, some of those tombs were possibly revealed as "very ancient" graves. Such falsification of the history are not unusual.

In every case, all the possible variants for the dating of the Petosiris zodiacs, perfectly agree with the dates obtained for the other Egyptian zodiacs. All these dates belong to the epoch from the 12th to 19th centuries, during which the real history of ancient Egypt was taking place. For the record, all these results constitute one more independent confirmation of the new mathematical chronology of the ancient world (see [105]).

We were very fortunate to have two zodiacs located in the same tomb. From the astronomical dating viewpoint this is an important factor. We expect that the dates shown on the both zodiacs should be close one to another. It is rather obvious that they are related to the buried in the tomb person.

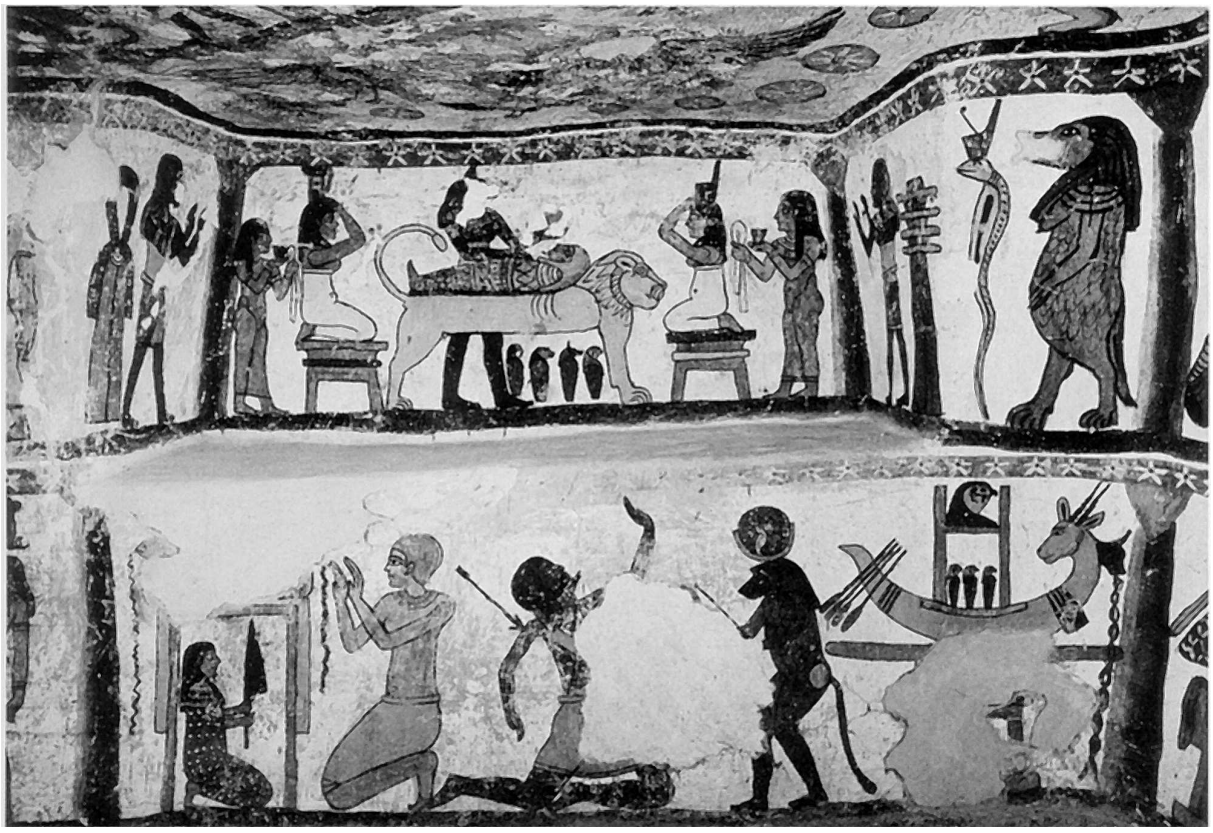

Figure 8.14: *Fragment of the mural inside the inner chamber of the Petosiris tomb.*

On the other hand, the probability of having close dates for two independent zodiacs is very small (see section 6.5). Therefore, if the Petosiris zodiacs were only based on the fantasy of their creators without any connection to the real astronomical events, exactly like it is suggested by the authors of [5], it would be very unlikely to expect any pair of solutions belonging to the historical time interval. Our computations show that such pairs of solutions indeed exist. Therefore, the astronomical meaning of the Petosiris zodiacs can be decoded and their dates revealed.

8.4.1 Story of the Discovery and Analysis of the Petosiris Zodiacs.

Based on the material in [5], let us present a short story of the Petosiris zodiacs, how they were discovered and analyzed.

The Petosiris zodiacs were excavated in the Egyptian oasis of Dahla — the largest oasis in the "Northern desert" of Nile. It is located about 350 km North from Luxor (see [98], p. 95.). The zodiacs were painted on the ceilings inside of an old crypt, which was carved in a rocky hill-side (see Figure 8.16). It is believed that there was buried a man with the name Petosiris (see [5]). The tomb was composed of two chambers — one connected to the passage leading outside the tomb, which we call the outside room, and another one, which we call the inside room (see Figure 8.15). The zodiacs were painted in color and they were well preserved. Each of them contained a horoscope (see Figures 8.16 — 8.18).

In 1973 the Petosiris zodiacs were brought into attention of Egyptologist by the Egyptian archaeologist Ahmed Fakhry, who showed their photographs to the prestigious experts in the ancient Egyptian astronomy: O. Neugebauer, R.A. Parker, and D. Pingree. He requested from them to analyze these two zodiacs (see [5], p. 96). In 1982, these three authors published an elaborated article devoted to the Petosiris zodiacs (see [5]). The article contained a detailed descriptions and many photographs of the zodiacs. Let us state it clearly that O. Neugebauer, R.A. Parker, and D. Pingree presented in [5] a complete decoding of these zodiacs, including the identification of all the planets on each of them. As it was confirmed by our analysis (see below), their decoding was correct.

The unique identification of all the planetary symbols on these zodiacs can be done in a routine way without any problem. As a consequence, O. Neugebauer, R.A. Parker, and D. Pingree were clearly in a position to complete the proper astronomical dating of the Petosiris zodiacs. For this purpose, it would suffice to identify the planetary locations and to make the appropriate astronomical computations. By using special programs for astronomical computations, or even, with a help of professional astronomers, these tasks could be easily accomplished. Unfortunately, O. Neugebauer, R.A. Parker, and D. Pingree were not interested in carrying out any attempt

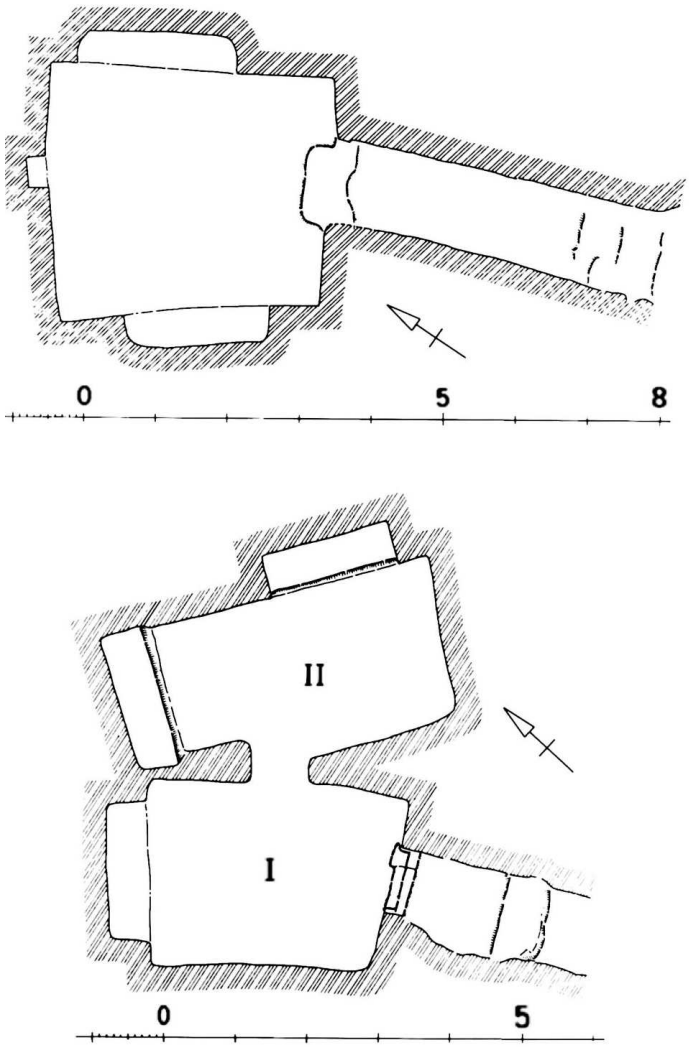

Figure 8.15: *Plans of the of the Petubastis tomb (above) and the Petosiris tomb (below).*

to date these two zodiacs astronomically. On the contrary, right in the beginning they exclude any idea of the astronomical dating by saying that: "*The positions of the planets seems to be inspired by Mithraism*[8]." That means, they simply assumed that the zodiacs were just imaginary pictures inspired by primitive believes related to the worship of Mithra. Of course, by assuming fictitiousness of the zodiacs, the astronomical dating became completely pointless for them. Instead of astronomical computations, they plunge into an obscure deliberation of the religious symbolism of these zodiacs. For example, they claimed that Venus and Saturn represent "*generative forces in the two spheres*" and etc. For Neugebauer, Parker, and Pingree, the fact that Venus and Saturn are shown in specific locations on the Petosiris zodiacs, has no astronomical but only a Mithraic meaning[9].

[8] See [5], p. 100
[9] See [5], p. 100

In the first chapter of this book we have already explained the possible reasons why contemporary Egyptologists are strongly opposed to any attempt of astronomical dating of the ancient Egyptian zodiacs. The paper [5] by O. Neugebauer, R.A. Parker, and D. Pingree, is a very typical example of this attitude. Nevertheless, we have to acknowledge that their decoding of the planetary symbols on the Petosiris zodiacs is correct and rather complete.

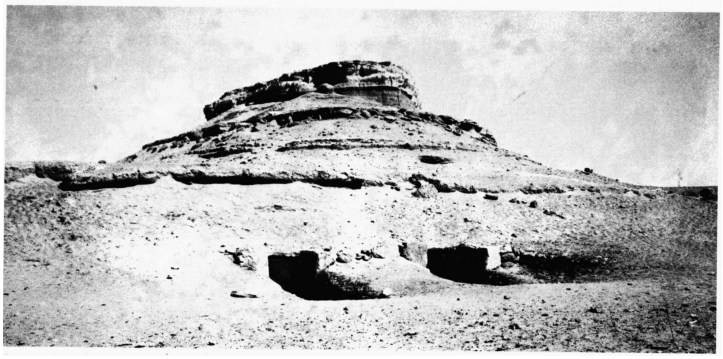

Figure 8.16: *A photograph showing the entrance to the Petosiris and Petubastis tombs.*

8.4.2 General Description of the Petosiris Tomb and Its Zodiacs

On Figure 8.16, we show a photograph of the hill, in the slope of which was carved the Petosiris tomb. On this photograph one can distinguish two rectangular holes in the hill slope, which are the entrances into the Petosiris tomb and the Petubastis tomb. The Petubastis tomb was carved right next to the Petosiris tomb. It is also described with all the details in above mentioned work [5] of Neugebauer, Parker, and Pingree. A zodiac was also found in the Petubastis tomb, but it did not contain any horoscope, so it is impossible to date it astronomically. Nevertheless, since these two tombs were located one next to the another, it is very probable that they were constructed during the same epoch. As the both tombs were definitely constructed during the same time, the astronomical dating of the Petosiris zodiac can also provide us with the information about the age of the Petubastis tomb. The zodiac found in the Petubastis tomb was shown on Figure 2.22 in Chapter 2.

Plans of these two tombs — the Petosiris and Petubastis tombs are shown on Figure 8.15. On this drawing, it is clearly shown that the Petosiris tomb consisted of two chambers — the outer chamber I and the inner chamber II. The zodiacs (P1) and (P2) were painted in color (see Figures 8.19 and 8.20) on the ceilings of these two rooms. The zodiac (P1), which was located in the outer chamber of the Petosiris tomb, is shown on Figure 8.17. We call it simply the outer Petosiris zodiac. The zodiac (P2) painted on the ceiling of the inner

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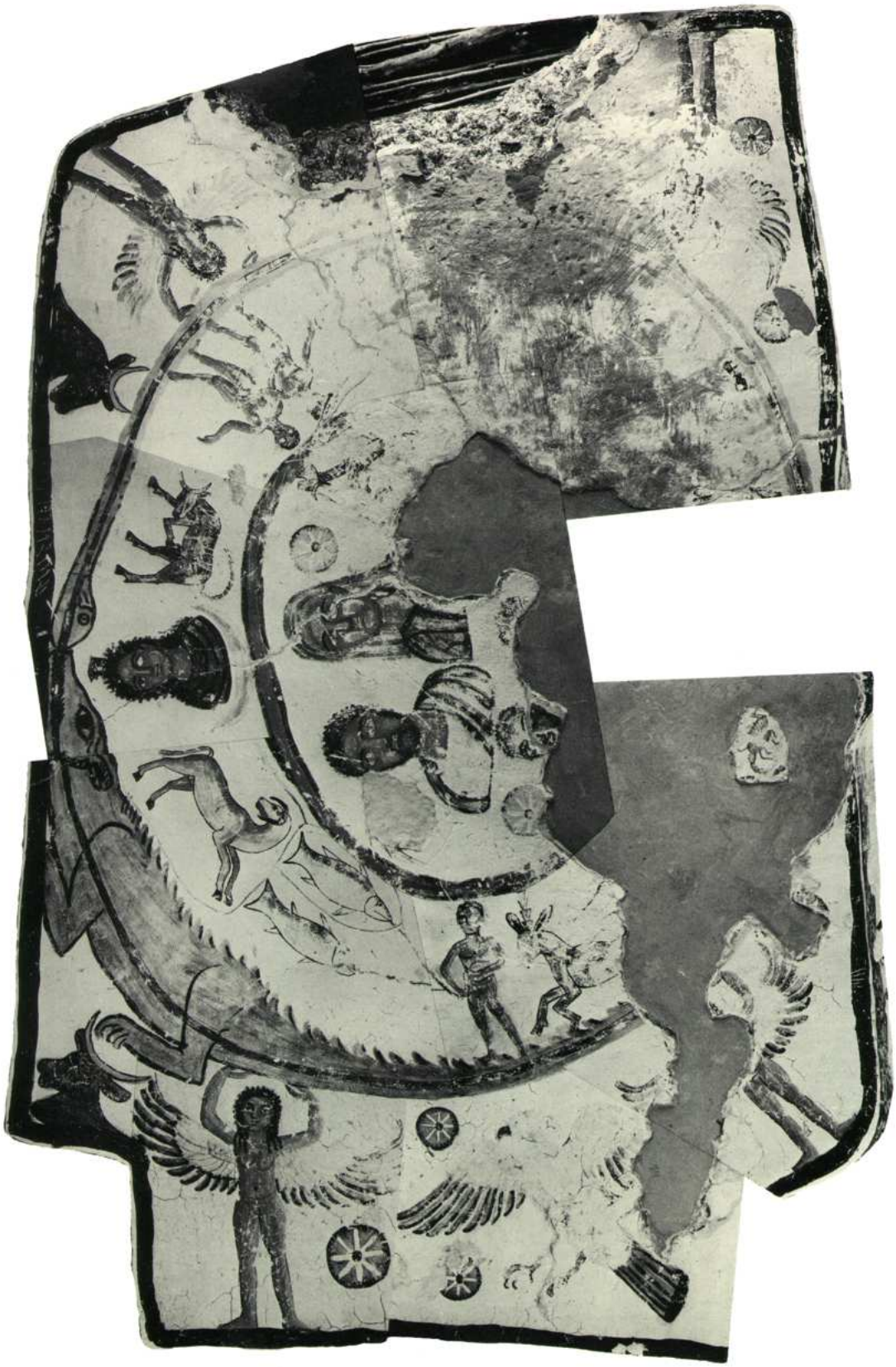

Figure 8.17: *The zodiac from the outer chamber in the Petosiris tomb.*

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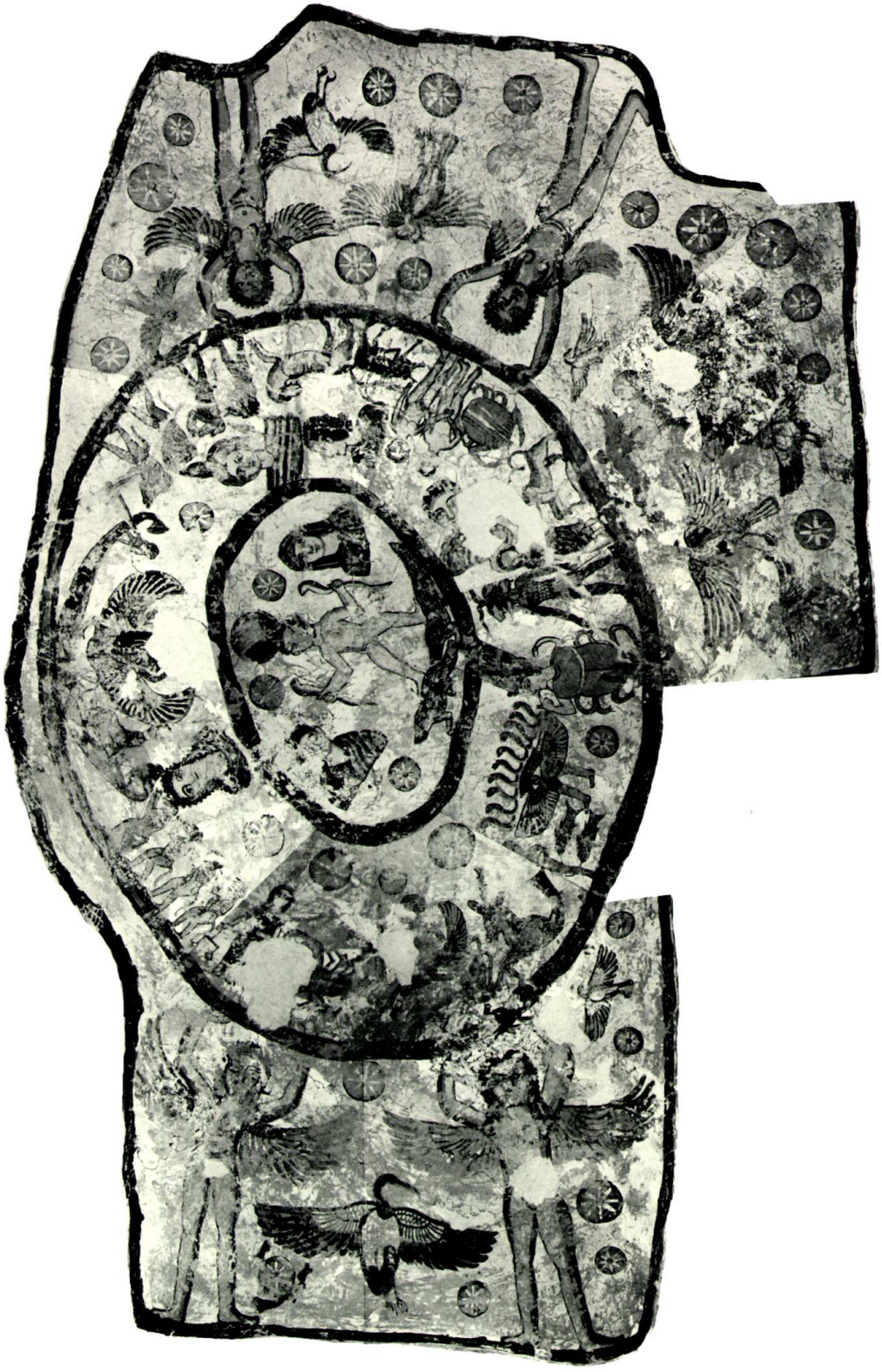

Figure 8.18: *The zodiac from the inner chamber in the Petosiris tomb.*

chamber, which is shown on Figure 8.18, is called by us the inner Petosiris zodiac.

Figure 8.19: *Few details of the zodiac from the outer chamber in the Petosiris tomb.*

Figure 8.20: *Few details of the zodiac from the inner chamber in the Petosiris tomb.*

On Figures 8.21 and 8.22 we present the contour drawings of the outer and the inner Petosiris zodiacs. From these pictures it is clear that both Petosiris zodiacs are of the round type, and from that point of view they are similar to the Athribis zodiacs and the Round Denderah zodiac. Moreover, the dimensions of the Petosiris zodiacs are also comparable with the size of the Round zodiac. These dimensions are: the outer Petosiris zodiac (P1) (see Figure 8.17) 2.34×2.63 meters, and the inner Petosiris zodiac (P2) (see Figure 8.18) 2.12×2.62 meters[10].

One can immediately notice that the inner Petosiris zodiac (P2) contains more details than the outer zodiac (P1). Therefore, it seems that it is the main zodiac for this tomb, probably commemorating the date of the death of the person buried there. On the other hand, the outer zodiac (P1) most likely contains the date of the birth or another secondary date related to that person. Notice that from the point of view of religious rituals the death of a person (and not the birth) is considered as the main event. Since the birth date precedes the date of the death, we expect that the outer Petosiris zodiac (P1) should indicate an earlier date than the inner zodiac (P2). However, we should point out that in our computations we did not introduce any additional requirement related to this issue, and in fact, we have considered all the possible pairs of solutions regardless which one is earlier than other.

Since the both zodiacs were found in the same tomb, the difference of their dates should not be loo large. For the purpose of our computations we allowed 150 years difference between those dates. This restriction was motivated by the assumption that the both zodiacs are related to the life of a one person, which was buried in this tomb. Therefore, the difference between the two dates encoded into the Petosiris zodiacs shouldn't be larger than a human lifespan. In order to make sure that we do not omit any admissible pair of solutions, we extended this time by some margin to 150 years. At the end of our computations, we found out that for any possible variant this difference was always smaller than 50 years. In addition, the dates for the outer zodiac (P1) were always earlier than the dates for the inner zodiac (P2).

It is clear that (see Figures 8.21 and 8.22) the both Petosiris zodiacs are very similar one to another. On the both zodiacs, the zodiacal constellations are arranged around a circle, inside which are located the planetary symbols. All the planets are represented in an unusual for traditional Egyptian zodiacs way — in a form of human busts. The outer zodiac (P1) is partially damaged, but still it is possible to recognize that the same planetary symbols — human images, are shown on the both zodiacs. In this situation, it is completely natural to expect that these two zodiacs are in fact only the parts of a larger artistic composition painted on the walls and ceilings of the Petosiris tomb. The symbolism of the entire composition should be the same in all its fragments and parts. On Figures 8.21, 8.24–8.26, we included a series of photographs showing the murals from the Petosiris tomb. On Figure 8.27 we show for comparison a photograph from the Petubastis tomb. The design of this tomb is much simpler than in the case of the Petosiris tomb, but the style and symbolism are very similar.

[10] See [5], pp. 96-97.

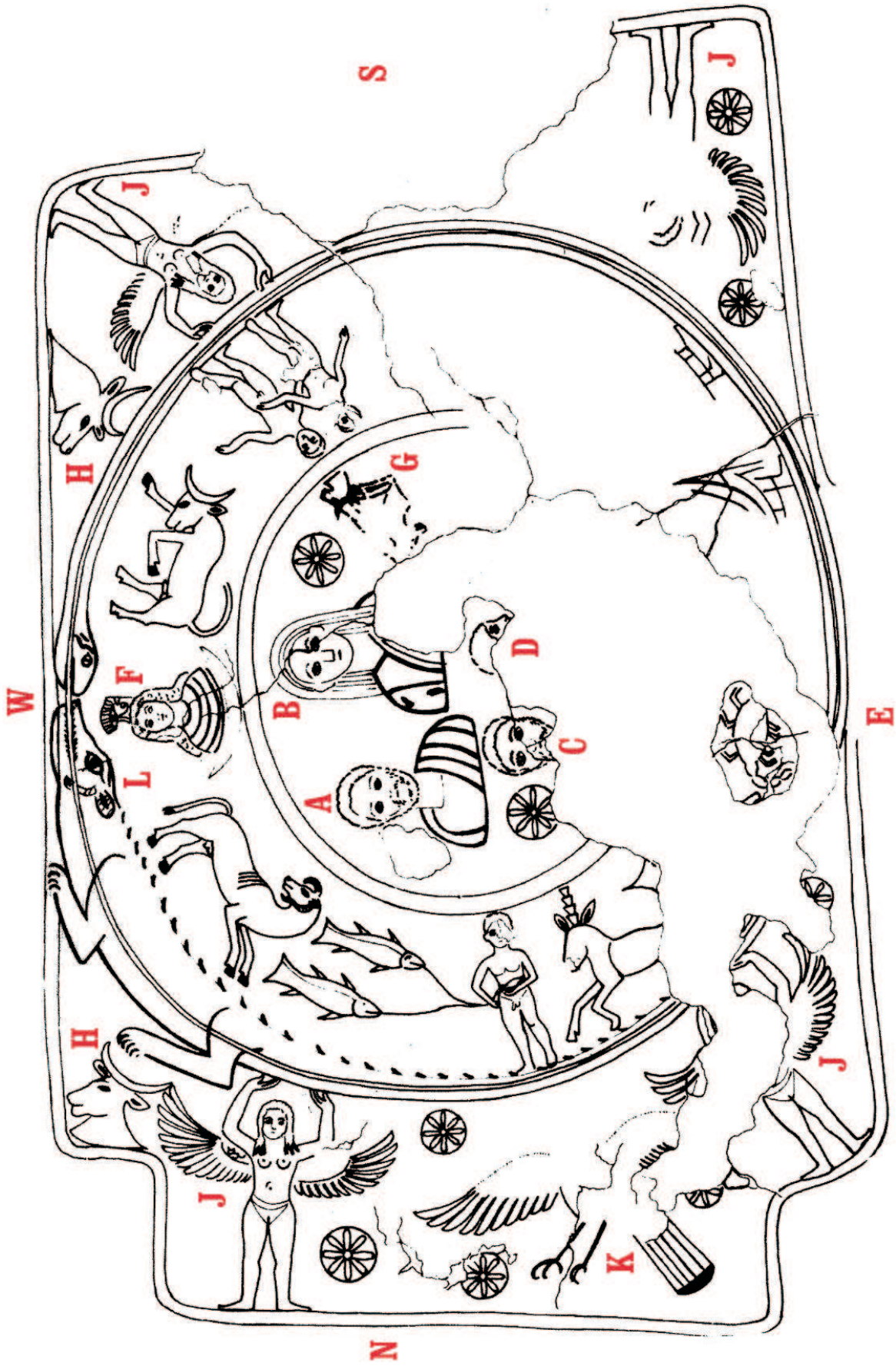

Figure 8.22: *A contour drawing of the zodiac (P1) from the outer chamber in the Petosiris tomb.*

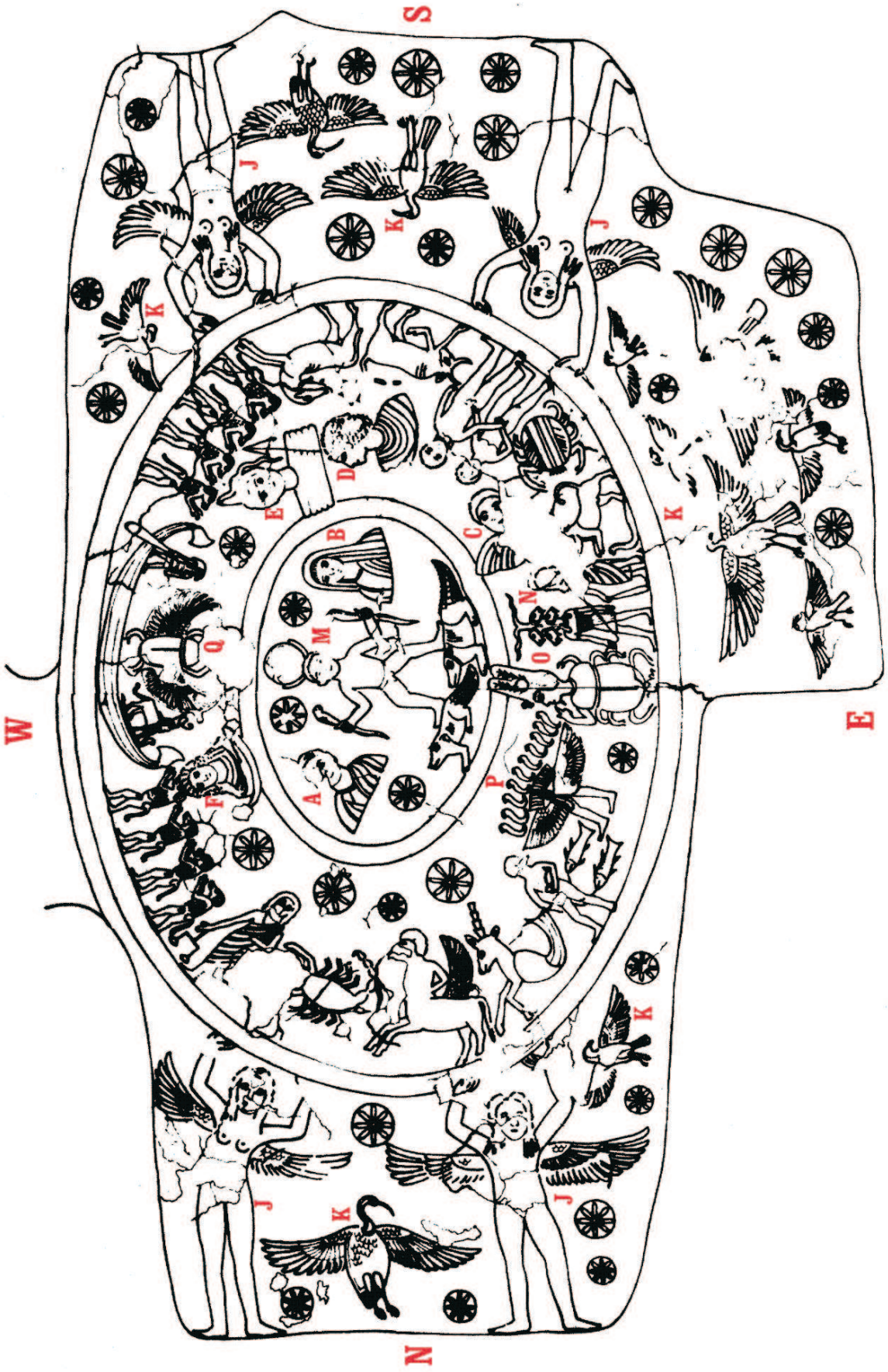

Figure 8.23: *A contour drawing of the zodiac (P2) from the inner chamber in the Petosiris tomb.*

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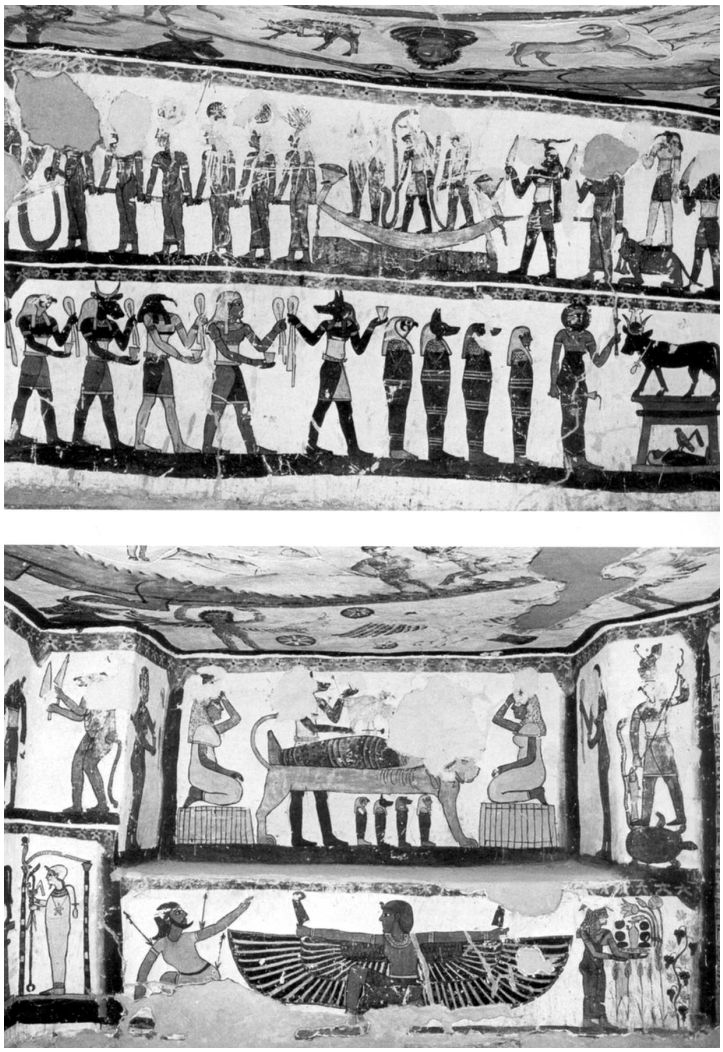

Figure 8.21: *Murals inside the Petosiris tomb.*

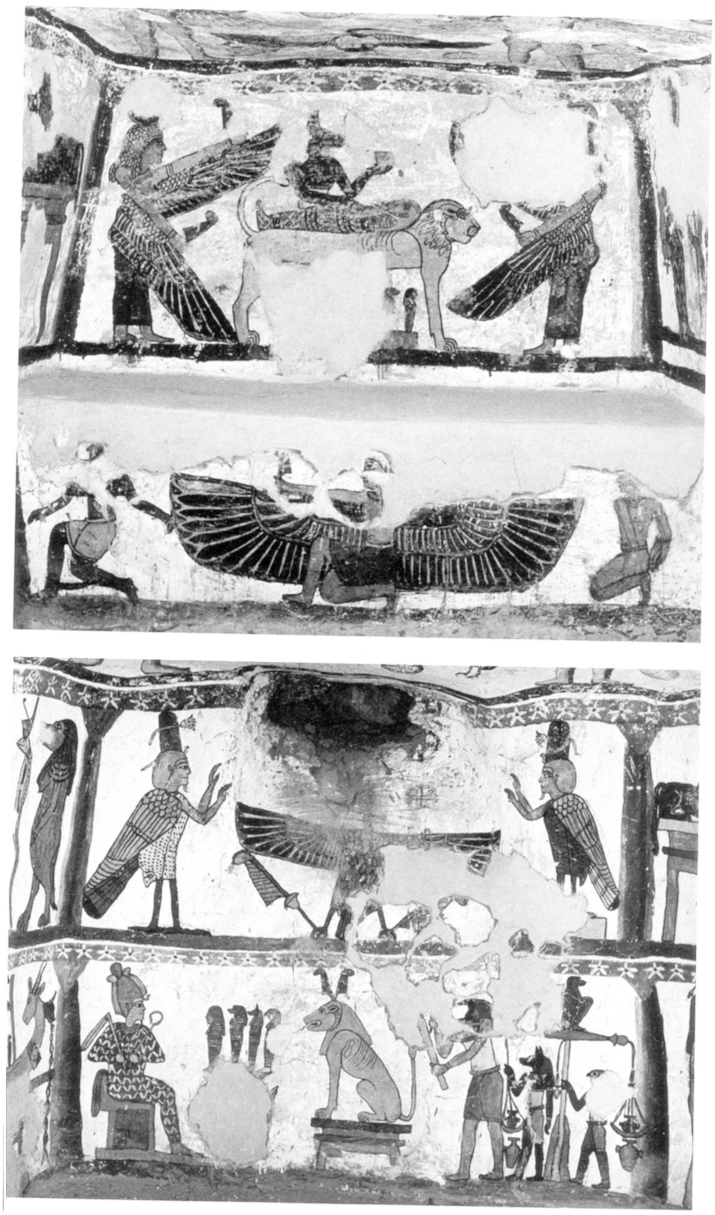

Figure 8.24: *Another fragment of murals inside the Petosiris tomb.*

We should mention that we have seen a very similar situation in the case of the two Athribis zodiacs. These zodiacs were also painted inside a tomb and their planetary symbolism was also exactly the same. Let us recall that for the Athribis zodiacs the difference between their dates was exactly 38 years, what could be the age of the person that is buried there. So, it is most likely that the Athribis zodiacs contain the dates of the birth and the death of the occupant of the tomb. Regarding the Petosiris zodiacs, their purpose was probably the same as in the case of the Athribis zodiacs — to record the dates of the birth and death.

Let us notice that although we allowed at most 150 years difference between the dates for the Petosiris zodiacs, for all the results that we obtained, this difference was much smaller. We can consider it as one more indication that there was no other purpose of the zodiacs. For example, it could be possible that these zodiacs were associated with two, instead of one, occupants of the tomb — for example two close relatives.

Nevertheless, based on our experience with the Egyptian zodiacs (the Athribis, Brugsch's and Petosiris zodiacs) it seems to us that two zodiacs or, two horoscopes on one zodiac, were used by "ancient" Egyptians for the birth and the death of the tomb's owner. We should also clarify that our hypotheses can be helpful in explaining the obtained results, but they do not have any implications on the computations of these dates.

8.4.3 Planetary Symbols on the Petosiris Zodiacs

Let us present the decoding of the planetary symbols on the Petosiris zodiacs that were described in the work [5] by O.

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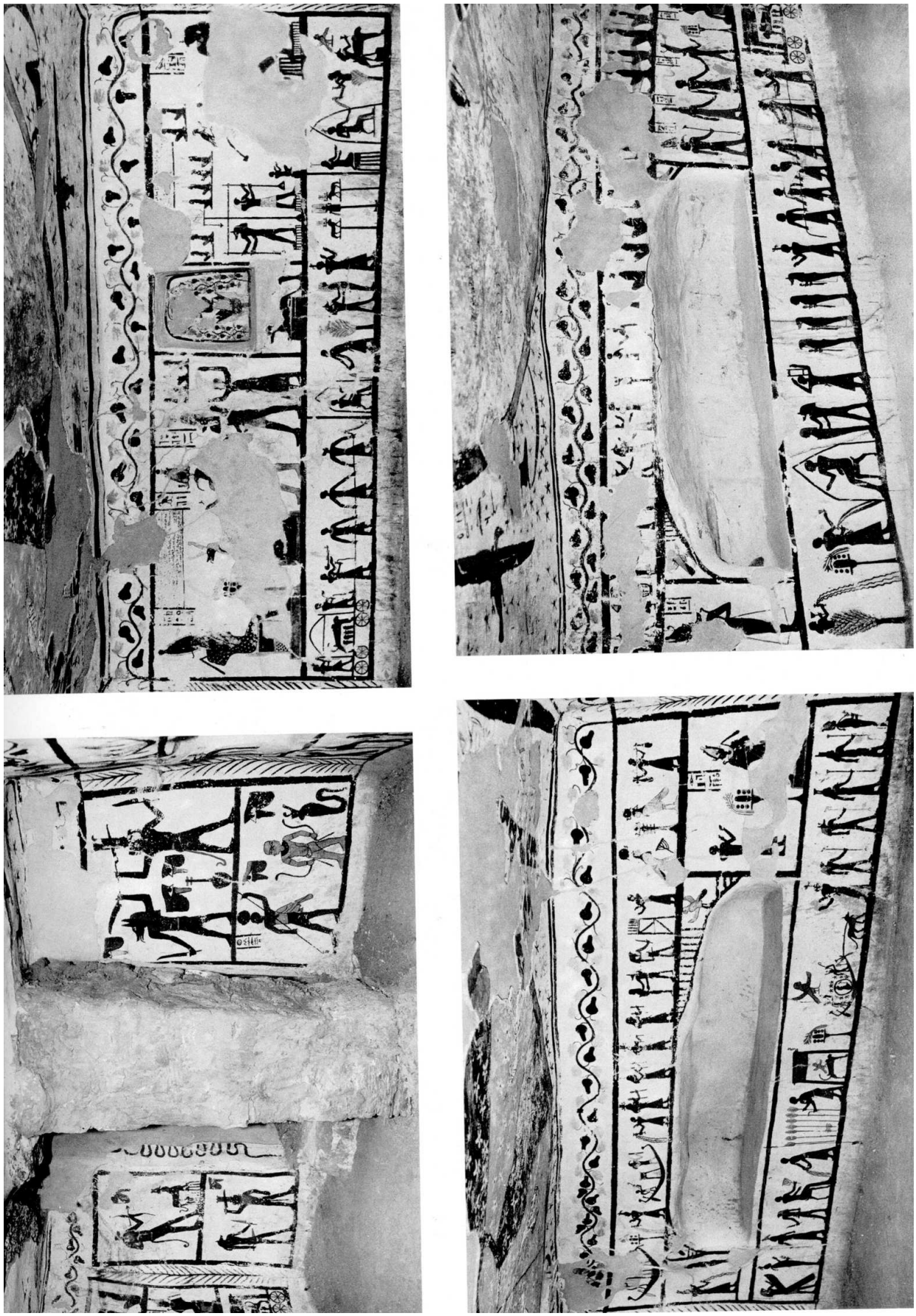

Figure 8.27: *Murals from the Petubastis tomb.*

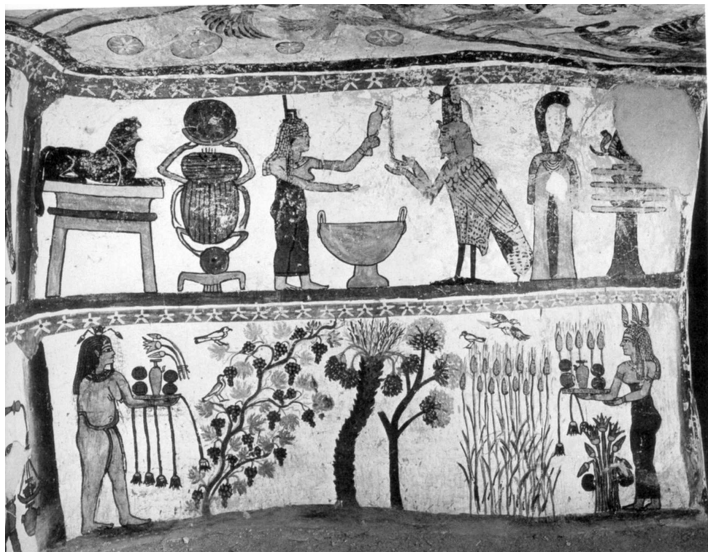

Figure 8.25: *Fragment of murals inside the Petosiris tomb.*

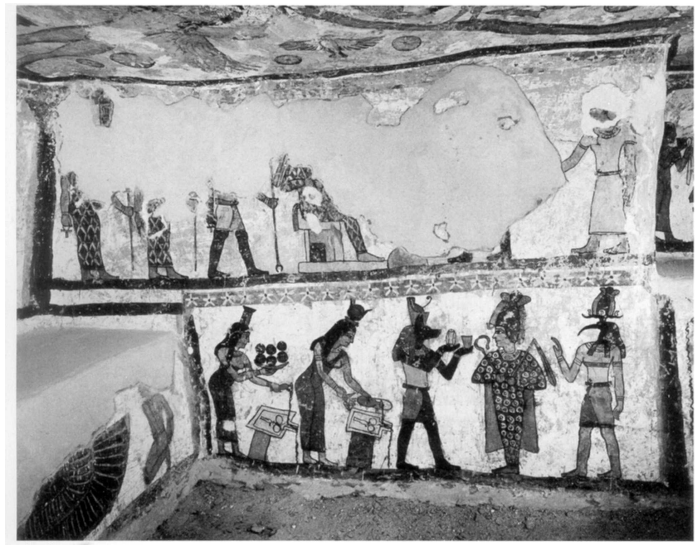

Figure 8.26: *One more fragment of murals inside the Petosiris tomb.*

Neugebauer, R.A. Parker, and D. Pingree[11]. We do not have any objection regarding the correctness of this decoding. It is conformed to the general principles of the Egyptian astronomic symbolism, which were presented earlier in the previous chapters. However, we should point out that this decoding contains a small flaw leading to a possibly different planetary identification. We have to acknowledge that the authors of [5] were aware of this weakness of their decoding. From this perspective, it is necessary to consider additional decoding variants. Fortunately, there exists only few such variants — two for each of the Petosiris zodiacs. All together, there are just four possible combinations.

[11] See [5], pp. 96-98

For the convenience of using the citations from the work [5], we preserved on Figures 8.22 and 8.23 the annotations **A**, **B**, **C**, **D**, **E**, **F**, and **M**, made by O. Neugebauer, R.A. Parker, and D. Pingree. They are placed on the zodiacs right next to the planetary figures represented by human busts. Notice that the same letters indicate very similar figures in both Petosiris zodiacs. For example the letter **A** stands by the busts of a bearded man in the center of the zodiacs, and the letter **B** are placed near the busts of a woman. We will use these annotations in order to present several citations form [5].

With respect to the zodiac (P1), which was located in the outer chamber of the Petosiris tomb, O. Neugebauer, R.A. Parker, and D. Pingree writes the following (see Figures 8.22 and 8.23):

"Planets:...

A: Bust of bearded male, wearing a tunic (probably Saturn, ...).
B: Bust of female, therefore Venus, wearing a cloak (palla, ...).
C: Bust of male, only upper part of head preserved (probably Jupiter).
D: Probably a double-faced male bust, with only the part facing right preserved (Mercury).
E: Nothing preserved of Mars.
F: Moon — Bust of female in Greek style, long hair falling over shoulders, Egyptian garment, 𓂀-eye on head, crescent below.[12]

Regarding the zodiac (P2) from the inner room, the authors of [5] make a correct connection between the same or similar planetary symbols on the zodiac (P2). Let us quote from [5]:

"Planets: ...

A: Similar to **A** *in outer room but without beard and mustache and with the toga closed in front, dark garment, in central area (Saturn, ...).*
B: Similar to outer room figure, in central area (Venus, ..).
C: Bust of male, apparently the same as in the outer room, wearing a toga, above Leo (Jupiter, ...).
D: Bust, two-faced, bearded male (on right) and female (on left), above Taurus (Mercury).
E: Bust of male, wearing a scarf knotted under the chin and above a crest with tail, shoulders protected by armor under garment(?), with spear, above Aries (Mars).
F: Moon — As in outer room but without 𓂀-eye.[13]

If we compare the above identifications of Venus, Mercury, Moon and Mars, with their representations in the tables of the Egyptian astronomical symbols in section 5.4, then we have to conclude that O. Neugebauer, R.A. Parker, and D. Pingree identified these planets correctly. Indeed:

[12] See [5], page 96.
[13] See [5], page 98.

Venus — the only "female" planet except Moon. It can be easily recognized on the both Petosiris zodiacs. Since the female bust with a crescent below can be conclusively identified as **Moon**, the only remaining female bust is definitely Venus.

Mercury — it can be easily recognized by its two-faced head.

Mars — on the zodiac (P2), it is shown as a warrior with a spear and helmet. It fits perfectly the role of Mars as the god of war. On the zodiac (P1), figure of Mars is missing — it was probably located in the destroyed fragment of the zodiac.

With respect to the above identifications of Jupiter and Saturn, it is not possible to know, without carrying out astronomical computations, which of the remaining busts exactly symbolize these planets. The authors of [5] are not completely sure about their identification either. In the case of Jupiter and Saturn on the zodiac (P1) they consider their identifications only as *probable*.[14] Indeed, the male busts of Jupiter and Saturn are almost identical on the both Petosiris zodiacs (see Figures 8.22 and 8.23). No specific particularity or attribute exists in those busts which could help to distinguish their essential differences. Therefore, it is necessary to consider the both variants of identification of those planets for each of the zodiacs (P1) and (P2).

However, the authors of [5] didn't bother to consider other variants of identification of Saturn and Jupiter. They simply arbitrarily choose only one variant for their identification on each of the zodiacs and reject the other possibilities. In fact, while talking about the inner Petosiris zodiac, they simply make identification of Saturn and Jupiter without mentioning that it is only *probable*. They do not support their claims with any additional information.

In order to avoid the unnecessary presuppositions, in our research we did consider all the possible combinations for the identification of Saturn and Jupiter on each of the Petosiris zodiacs. As it is easy to check, there are exactly four variants of identifications for these planets.

The only remaining planet on the Petosiris zodiacs that has not been yet identified is the Sun. On the inner zodiac (P2) it is clearly symbolized by the circle located on the head of a boy M standing in the middle of the Central Circle (see Figure 8.23). The boy clenches two snakes in both hands. Very similar pictures appear on other Egyptian monuments, where they obviously symbolize the Sun. Let us notice that the two vertical snakes in the boy's hands clearly symbolize Mercury (see subsection 5.4.10). With respect to two crocodiles under his feet, we have seen similar symbols on the other Egyptian zodiacs (for example the Thebes and Brugsch's zodiacs) in connection to Venus. This whole scene has a very clear meaning: the boy-Sun is surrounded by two always close to him planets — Venus and Mercury. Each of those planets has double nature related to their morning or evening visibility, what is indicated here by two copies of each of the related symbols (i.e. two snakes and two crocodiles). Consequently, besides the Sun we can recognize here a minimal partial horoscope. We will see it in a moment that this is a partial horoscope of the spring equinox.

In this way we can conclude that on the inner Petosiris zodiac (P2) the Sun is shown inside the Central Circle.

On the preserved part of the outer Petosiris zodiac (P1), the symbol of the Sun is most likely missing. Thus, the representation of the Sun was probably located in the fragment of the zodiac that was destroyed, i.e. somewhere around the constellations Cancer, Leo, Virgo, Libra, Scorpio or Sagittarius. However, it shouldn't be excluded that the Sun could still be symbolized by another symbol inside the preserved part of the zodiac. For example by the symbol of 𓂀-eye above the female bust representing Moon (see Figure 8.22). Nevertheless, our computations proved that this particular identification did not lead to any final solution for the Petosiris zodiacs. We can consider these results as a kind of confirmation of our hypothesis that the symbol 𓂀 on the Egyptian zodiacs did not stand for any particular planet, but it was a way to indicate that a particular planet was in a proximity of the star Eye of Aries (Alpha Aries) (see subsection 5.4.12).

8.4.4 Constellations Symbols. Equinoctial Break on the Zodiac (P2)

The constellation symbols on the Petosiris zodiacs are completely standard and easy to recognize. However, the orders of the zodiacal constellations on these two zodiacs are essentially different (see Figure 8.22 and 8.23). Let us try to understand what it is about.

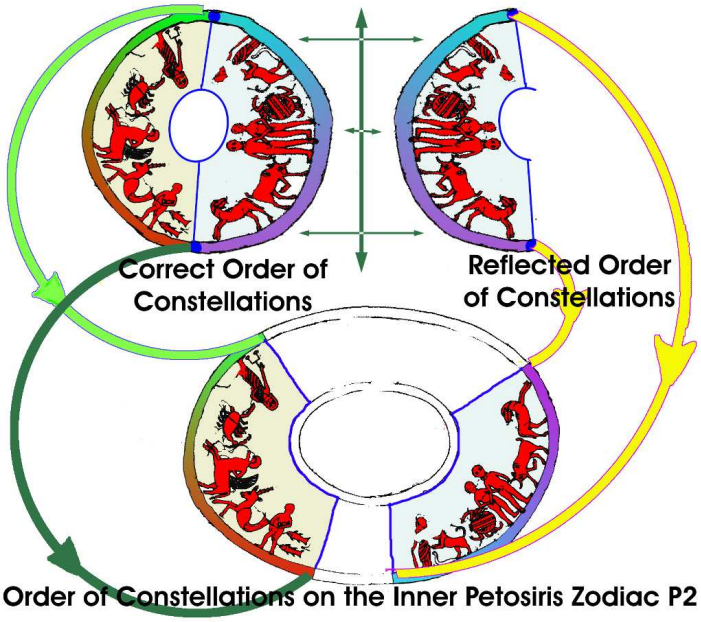

Figure 8.28: *Unusual Order of the Zodiacal Constellations on the Inner Petosiris Zodiac (P2)*

[14] See [5], page 96

On the zodiac (P1) the order of the constellations is the same as observed on the real sky. However, on the zodiac (P2) the zodiacal constellations are arranged in a very unusual way. The ecliptic on the zodiac (P2) is cut in half through the equinox points and then the order in one of the halves is reversed (or simply it is reflected) before they are again put together (see Figure 8.28). In this way Virgo becomes a neighbor of the another equinox constellation — Pisces, while at the top of the zodiac, Libra follows Aries. Notice that there is a large supplementary scene on a boat inserted between Libra and Aries. It is clear that the correct order of the zodiacal constellations was twice violated.

The idea behind this unusual transformation is rather obvious — to put the two equinox constellations together in the main spot on the zodiac. In this way Virgo (the autumn equinox) and Pisces (the spring equinox) appear on the zodiac (P2) one next to the other (see Figure 8.28).

Regarding the "main" place on the zodiac (P2), let us point out that there is a clear vertical direction. In other words, the composition of the zodiac gives us an impression that there is a top and a bottom of the zodiac. For example all the planetary busts on the both zodiacs appear like "standing," with the same orientations of their bodies (see Figures 8.22 and 8.23). On the other hand, the symbols of constellations are placed around a circle with their feet pointing out from its center. Since the orientations of these figure are not the same, they do not look like "standing" together — there is no common for them vertical direction. There is only one place on each of the Petosiris zodiacs, where the zodiacal constellations are lined-up with the same orientation as indicated by the vertical axis of the zodiac. This place is the bottom of the picture, where we can say that the constellations are "standing" up. At any other place the constellation figures are either slanted or in upside-down positions with respect to the bottom and the top of the zodiac.

On the outer zodiac (P1), this "main" location corresponds to the constellation of Virgo. The autumn equinox is located at that place as well. Unfortunately, the figure of Virgo is missing because of some damages in this area of the zodiac. However, the fragment with the next to Virgo figure of Scorpio was preserved, from which it is clear that Virgo indeed was there (see Figure 8.22).

On the inner zodiac (P2), at this "main" location we find the usual symbols of equinoxes — a figure with four heads and a chain of snakes, all looking in the same direction (see section 5.8). On each of their sides, there are placed Pisces and Virgo — the two equinoctial constellations.

We can conclude that on the zodiac (P2), there is a particular emphasis made on the both equinox points. In the same time on the zodiac (P1), at this "main" location there is only one equinox point — the autumn equinox. For the creator of the Petosiris tomb this was the most important equinox — it was the beginning of the Egyptian new year (see section **??**).

On the zodiac (P2), the both halves of the zodiacal circle are disconnected. In particular they are considerably split apart at the top. The important elements that are located in the Equinoctial Break are:

1. the symbols of equinoxes (at the bottom of the zodiac);
2. the central circle containing the Sun and two other planets;
3. some other symbols in the upper part of the zodiac, including the boat and located in it figures (see Figure 8.23).

All the above symbols are encircled by the two halves of the zodiacal constellation circle.

The most crucial for the astronomical dating is the fact that the central circle with the Sun and two other planets is entirely contained inside the Equinoctial Break on the zodiac (P2). There are also included inside the Break the usual equinox symbols. The most probable interpretation of this design would be that the Sun, together with two other planets of the main horoscope (shown as human busts) were located near the equinox point. In particular, it is not hard to imagine which one of the equinox points it should be. Notice that Mercury on this zodiac is doubtlessly shown in Aries or Taurus (see Figure 8.23). On the other hand the Sun could not be too far from Mercury (at most 2 zodiacal constellations), therefore we have to exclude the autumn equinox point as its location. Notice that the distance from Mercury to the autumn equinox point, to Aries or to Taurus, is not less than 5 zodiacal constellations. Therefore, the Sun and two other planets of the main horoscope were located near the point of the spring equinox.

Let us conclude this section with a remark that a similar breaking of the zodiacal circle into two symmetric halves we have already seen in the case of Brugsch's zodiac. The only difference is that the zodiacal circle was split into two parts at the solstice points near Sagittarius and Gemini, instead of the equinox points (see Figures 2.17 and 3.15). That means, that on Brugsch's zodiac the emphasis was made on the solstice points, while on the inner Petosiris zodiac the equinox points were given a special status. Otherwise, in both cases the idea was the same.

We begin with a description of our astronomical computations for the inner Petosiris zodiac, which was better preserved.

8.4.5 Constellations Figures on the Inner Petosiris Zodiac P2

As we have explained in the previous subsection, the ecliptic on the zodiac P2 is split into two halves. In its left half there are shown the following constellations (clockwisely from the bottom to the top — see Figures 8.23 and 8.28):

Pisces — shown as a couple of fish;
Aquarius — represented by a figure of a naked man holding Pisces on strings coming out from their mouths;

Capricorn — is featured as a fantastic animal, which is its typical symbol;
Sagittarius — is shown in its usual form – a centaur;
Scorpio — as a scorpion;
Libra — is symbolized by a figure of a woman holding a scale with two weights in her hands (a similar symbol of Libra was also used on the Big Esna zodiac).

In the right half of the ecliptic on the zodiac (P2) are shown the following constellations (counter-clockwise from the bottom to the top):

Virgo — a female figure (its central part is missing);
Leo — a lion standing on a snake;
Cancer — a cancer, which is its typical representation on the Egyptian zodiacs;
Gemini — two naked boys holding their hands;
Taurus — a charging bull;
Aries — a ram.

We can conclude that on the inner Petosiris zodiac all the symbols of the 12 zodiacal constellations were sufficiently preserved so they can be easily identified.

8.4.6 The Main Horoscope on the Inner Zodiac (P2)

On the inner Petosiris zodiac (see Figure 8.23) the locations of Mars (annotated with the letter **E**), Mercury (annotated with **D**) and one more planet (annotated with the letter **C**) are shown clearly and conclusively. By elimination, the planet **C** can only be Saturn or Jupiter. Mars holding a spear is shown in Aries or in Pisces. Two-faced Mercury is located in Aries or in Pisces, and the third (not yet identified) planet **C** is in Cancer or Leo (see Figure 8.23).

There remaining planets — the Sun, Venus and the third planet annotated with the letter **A** (see Figure 8.23) are shown inside the small circle in the center of the zodiac. Depending on a chosen variant of decoding, the planet **A** is either Jupiter or Saturn. Let us recall that we call this small circle the *Central Circle* of the zodiac (P2). It is clear that a special consideration was given to the location of these three planets inside the Central Circle. They occupy the central position inside the zodiac. In addition they are encircled by a thick line which separates them from the other planets in the zodiac.

Finally, Moon is shown in the upper sector of the equinoctial break (it is annotated by the letter **F**). Notice that the crescent, on which the bust of Moon is standing, is slightly overlapping with the thick oval line surrounding the Central Circle. Possibly, it could mean (but not necessarily) that Moon was close to the Sun and two other planets inside the Central Circle.

In this way, the planetary configuration of the Sun, the planet **A** (Jupiter or Saturn), and the most probably Moon on the zodiac (P2), clearly depends on the meaning assumed by the artist-astronomer, who designed this zodiac (see Figure 8.29) of the Central Circle. There are two possible interpretations of the Central Circle.

1. The Central Circle could simply signify that enclosed inside it planets were not far one from another. In this case the corresponding configuration of these planets should be exactly like it is portrayed on the zodiac (P2). Let us point out that independently of our interpretation of the Central Circle, it is clear that the planet denoted on Figure 8.29 by the letter **A** (the bust on the left from the boy representing the Sun), was not far from the Sun and Venus, i.e. it was in the proximity of the spring equinox point. This planet could not be in the proximity of Libra or Scorpio, in spite of the fact that on the zodiac (P2) they are shown as the closest to the planet **A** constellations. Indeed, if the actual location of the planet **A** was among the constellations shown in the left half of the zodiac (i.e. Libra, Scorpio, etc.), then it would also be on the opposite side of the ecliptic from the Sun and Venus. In such a case, enclosing this planet inside the Central Circle, together with the Sun and Venus, would not make any sense. Moreover, since the other planets shown on the right half of the zodiac were placed outside the Central Circle, it would be appropriate to expect that a planet located near Libra or Scorpio should be portrayed in a similar way. However, this is not the case on the Petosiris zodiac (P2). It is clear that the author of the zodiac (P2) ostensibly separated this planet from the constellation figures on the left and put it inside the oval-circle shown in the center of the zodiac, side by side with the Sun and Venus. Since Mercury is shown in Aries or Taurus, it is not astronomically possible that this planetary configuration would be close to any of the constellations in the left half of the zodiac (see Figures 8.23 and 8.29). We should remember that the Sun and Venus always appear not too far from Mercury, which is on the Petosiris zodiac (P2) shown exactly on the opposite from Libra and Scorpio side of the ecliptic.

   With such interpretation of the meaning of the Central Circle, we should also admit arbitrary order of Venus and Mars on the ecliptic. Although Venus is shown on the zodiac (P2) closer to the Sun than Mars, all these figures are related to the same location on the ecliptic with respect to the zodiacal constellations. Notice that on the zodiac (P2), Venus is located slightly lower than Mars (but still this difference is negligible), what could eventually be considered as an indication that Venus was more distant from the Sun. In addition, the inclusion of Venus inside the Central Circle could be dictated by the fact that it is much brighter than Mars (see Figure 8.29). For these reasons we gave the same consideration to all solutions regardless of the order of Venus and Mars.
2. The second possible interpretation: the Central Circle indicates a distinguished group of three planets (the Sun, Venus and one more planet), for which their positions on the ecliptic are indicated by the location of the circle.

Figure 8.29: *Color Annotated Inner Petosiris Zodiac (P2).*

Since the Central Circle is shown on the zodiac P2 inside the Equinoctial Break, the astronomical explanation of its meaning could be as follows:

The group of three planets, which included the Sun and Venus, was located in a proximity of one of the two equinox points. It was closer to that equinox point than any other planet. As we have explained earlier, this equinox point could only be the spring equinox. Otherwise we would get a contradiction with the location of Mercury. These planets are encircled by an oval in order to separate them from the constellation symbols. With this interpretation of the zodiac (P2), the order of Venus and Mars, contrary to the previous one, is well determined. Venus, together with the whole Central Circle, was closer to Aquarius and further from Taurus than Mars (see Figure 8.29).

We will refer to the first possible interpretation of the zodiac (P2) as the *Dispersed Central Circle*, and we will call the second one as the *Clustered Central Circle*. In this way we have obtained two essentially different decodings of the main horoscope on the zodiac (P2).

The Case of Dispersed Central Circle

Based on our discussion in the preceding subsection, we have the following decoding of the main horoscope on the zodiac (P2):

- Sun — in Aries or Taurus.
- Moon — near one of the equinox points (Aquarius-Pisces-Aries or Leo-Virgo-Libra)
- Jupiter (or Saturn) — in Aries or Pisces. In our computations we have also included the locations of Jupiter in Sagittarius, Capricorn and Aquarius, i.e. in all the constellations shown in the part of the zodiac on the left from the Central Circle. However, for those additional locations we found no solution in the whole historical time interval from the year 500 B.C. till 1900 A.D.
- Venus — in Aries or Cancer.
- Mars — in Aries or Cancer.
- Mercury — in Aries or Taurus.
- Saturn (or Jupiter) — in Cancer or Virgo.

In the case the third planet in the Central Circle was Jupiter, we have the following order of the planets on the ecliptic:

Jupiter–(Moon?)–Sun–Venus=Mars–Mercury–Saturn–(Moon?)

In the case the third planet in the Central Circle was Saturn, we have the following order of the planets on the ecliptic:

Saturn–(Moon?)–Sun–Venus=Mars–Mercury–Jupiter–(Moon?)

We have used the sign '=' in between of those planets (i.e. Venus and Mars) for which any possible order was considered. The position of Moon could be either near the spring or the autumn equinox point.

If Moon was located in a proximity of the spring equinox, then it would also be not too far from the planets of the Central Circle. In this case we required the same order of the planets as it is shown on the zodiac (P2). In other words, Moon should be in between the Sun and the planet denoted by the letter **A** — what is indicated on the zodiac by a small overlapping of the figure representing Moon with the Central Circle (see Figure 8.23 and 8.29).

On the other hand, a possible location of Moon on the opposite side of the ecliptic, near the autumn equinox point, does not contradict the idea of the *Dispersed Central Circle* either. Since Moon was not included among the planets inside the Central Circle it could be an indication that it was located far away from them. As Libra is the closest to Moon constellation on the zodiac (P2), consequently the location of Moon could be there — near the point of the autumn equinox located in the next to Libra constellation of Virgo (see Figures 8.23 and 8.29). Let us recall that in the planet **C** is also shown in Virgo (see Figure 8.23).

According to this interpretation, the purpose of the Central Circle on the zodiac (P2) could be to separate the planet **A** (which is located inside this circle) from Libra, and associate it with the Sun and Venus. Since the overlapping of Moon with the Central Circle is almost negligible, it is possible that its there is no relation between them. In this case the Moon's location is near Libra, between the planets **A** and **C**. Although Moon appears on the zodiac far from the planet **C**, its actual position is closer to **C** than to **A**. The order of the planets on the zodiac can be determined following the rules *from right to left* and *upward*: first, the planets on the right side from the Central Circle upward, next, the planets from the Central Circle from right to left, and finally Moon, which is shown at the highest position among all the planets. Let us point out that Mars is also shown on the zodiac (P2) slightly higher than Venus, thus it could symbolize that its position on the ecliptic was behind Venus. Because of this ambiguity, the order of Mars and Venus in the case of *Dispersed Central Circle* is uncertain. In our calculations, we've allowed for the positions of these two planets to be interchangeable. Notice that, on the one hand, Venus is placed inside the Central Circle beside the Sun, while Mars is shown outside the Central Circle. On the other hand, if we compare the projections of these planets on the external circle, which could be considered as an "ecliptic," it becomes clear that Venus may be further from the Sun than Mars. Therefore, in order to avoid any unjustified pre-assumption, we gave the equal consideration to all solutions regardless to the order of these two planets. In the final solution, it turned out (exactly how it was expected) that Venus was indeed closer to the Sun.

Let us present the input data for the program HOROS. Let us notice that the third and fourth variants of decoding (their codes P52 and P53) are simply obtained from the first two variants (their codes P52 and P51) by interchanging Jupiter

and Saturn. Let us recall that the planet **A** on the zodiac (P2) is shown as a male bust inside the Central Circle (see Figure 8.23).

```
ZODIAC: Inner Petosiris (P2)
DECODING VARIANT: Dispersed Central Circle, Planet A =
Jupiter, Moon near the spring equinox point.
CODE OF THE DECODING VARIANT: P50
ORDER OF PLANETS ON THE ECLIPTIC: JUPITER, MOON, SUN,
VENUS <-> MARS, MERCURY, SATURN
Venus is interchangeable with the Mars.
----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
      11.0   10.0    3.0    8.0   11.0   11.0   0.0
# TO: ------------------------------------------#
      1.0    1.0    5.0    1.0    1.0    1.0    2.0
# BEST POINTS: -----------------------------------#
      11.5   11.4    4.0   11.2   11.9   11.9   1.0
-------------------END OF DATA--------------------
------------------------------------------------------
```

```
ZODIAC: Inner Petosiris (P2)
DECODING VARIANT: Dispersed Central Circle, Planet A =
Jupiter, Moon near the autumn equinox point.
CODE OF THE DECODING VARIANT: P51
ORDER OF PLANETS ON THE ECLIPTIC: JUPITER, SUN, VENUS
<-> MARS, MERCURY, SATURN, MOON
Venus is interchangeable with the Mars.
----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
      11.0    5.0    3.0    8.0   11.0   11.0   0.0
# TO: ------------------------------------------#
      1.0    8.0    5.0    1.0    1.0    1.0    2.0
# BEST POINTS: -----------------------------------#
      11.6    6.5    4.0   11.2   11.9   11.9   1.0
-------------------END OF DATA--------------------
------------------------------------------------------
```

```
ZODIAC: Inner Petosiris (P2)
DECODING VARIANT: Dispersed Central Circle, Planet A =
Saturn, Moon near the spring equinox point.
CODE OF THE DECODING VARIANT: P52
ORDER OF PLANETS ON THE ECLIPTIC: SATURN, MOON, SUN,
VENUS <-> MARS, MERCURY, JUPITER
Venus is interchangeable with the Mars.
----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
      11.0    5.0    8.0    3.0   11.0   11.0   0.0
# TO: ------------------------------------------#
      1.0    8.0    1.0    5.0    1.0    1.0    2.0
# BEST POINTS: -----------------------------------#
      11.6    6.5   11.2    4.0   11.9   11.9   1.0
-------------------END OF DATA--------------------
```

```
ZODIAC: Inner Petosiris (P2)
DECODING VARIANT: Dispersed Central Circle, Planet A =
Saturn, Moon near the autumn equinox point.
CODE OF THE DECODING VARIANT: P53
ORDER OF PLANETS ON THE ECLIPTIC: SATURN, SUN, VENUS <->
MARS, MERCURY, JUPITER, MOON
Venus is interchangeable with the Mars.
----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
      11.0    5.0    8.0    3.0   11.0   11.0   0.0
# TO: ------------------------------------------#
      1.0    8.0    1.0    5.0    1.0    1.0    2.0
# BEST POINTS: -----------------------------------#
      11.6    6.5   11.2   4.2   11.9   11.9    1.0
-------------------END OF DATA--------------------
------------------------------------------------------

REMARK: The following constellation scale was used (see
section 6.10):
<0>ARIES<1>TAUR<2>GEMINI<3>CANCER<4>LEO<5>VIR<6>
LIB<7>SCORP<8>SAGITT<9>CAPRIC<10>AQUA<11>PISC<12=0>
```

The Case of Clustered Central Circle

In this subsection, we'll dicuss the second variant of decoding of the main horoscope on the zodiac (P2) — the variant with the *Clustered Central Circle*, i.e the Central Circle will be considered as a representation of a separate cluster of planets around the Sun. In this case, contrary to the previous variant of decoding, we will assume that the author of the zodiac depicted inside the Central Circle a distinguished group o planets and described its position instead of the locations of individual planets. Consequently, we do not need to analyze the locations of individual planets inside the Central Circle with respect to the "outside" constellation figures, but only the position of the whole group. In other words, the picture shown inside the Central Circle on the zodiac (P2), could simply be a representation the configuration of planets belonging to this group, without connection to the outside. As we already noticed, inside the Central Circle there is shown the Sum, Venus and one more male planet — possibly Jupiter or Saturn (see Figure 8.23).

In this way, by adopting this approach, we obtain the following decoding of the main horoscope on the zodiac (P2).

- Sun — in Aries or Pisces.
- Moon — near one of the equinox points (Aquarius-Pisces-Aries or Leo-Virgo-Libra)
- Jupiter (or Saturn) — in Aries or Pisces, next to the Sun.
- Venus — in Aries or Pisces, next to the Sun.
- Mars — in Aries or Pisces.
- Mercury – in Aries or Taurus.
- Saturn (or Jupiter) — in Cancer or Leo.

In the case the third planet in the Central Circle was Jupiter, we have the following order of the planets on the ecliptic:

$$\text{Jupiter}=(\text{Moon?})\text{–Sun–Venus}=\text{Mars–Mercury–Saturn–}(\text{Moon?})$$

In the case the third planet in the Central Circle was Saturn, we have the following order of the planets on the ecliptic:

Saturn=(Moon?)–Sun–Venus=Mars–Mercury–Jupiter–(Moon?)

Since Moon is shown inside the equinoctial break on the zodiac (P2), in this case, similarly to the case of the Dispersed Central Circle, there are two possible locations of Moon — near the spring or autumn equinox points.

In the case of an astronomical solution with Moon close to the spring equinox point, we relaxed the order requirements and allowed for the planet **A**, from the Central Circle) to be interchangeable with Moon. Since Moon is a fast moving planet, the loosening its order requirements didn't have a significant impact on generating new solutions. It only caused shifting of already obtained dates by few days.

On the other hand, if Moon was located near the autumn equinox point, we required that its position should be between the planet **A** and the planet **C** (see Figures 8.23 or 8.29). In other words, Moon should be between Saturn and Jupiter. Let us recall that in any variant of decoding , the planets **A** and **C** are Jupiter or Saturn, or vice versa.

In the previous variant, Venus and Mars were considered to be interchangeable. In the case of *Clustered Central Circle*, we assume that the closest to the Sun planets are shown in the Central Circle, so their respective order is uniquely determined. Venus is located inside the Central Circle, while Mars is not there. Consequently, Venus should be closer to the Sun than Mars (see Figures 8.23 or 8.29).

Let us present the input data for the program HOROS — the four additional variants of decoding. In this way we have the total of possible eight variants. Let us notice that the third and fourth variants of decoding (in the table below — their codes P63 and P64) are simply obtained from the first two variants (their codes P61 and P62) by interchanging Jupiter and Saturn.

```
ZODIAC: Inner Petosiris (P2)
DECODING VARIANT: Clustered Central Circle, Planet A =
Jupiter, Moon near the spring equinox point.
CODE OF THE DECODING VARIANT: P60
ORDER OF PLANETS ON THE ECLIPTIC: JUPITER <-> MOON, SUN,
VENUS, MARS, MERCURY, SATURN

----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
      11.0   10.0    3.0    8.0   11.0   11.0   0.0
# TO: ------------------------------------------#
      1.0   12.0    5.0    1.0    1.0    1.0    2.0
# BEST POINTS: -----------------------------------#
      11.5   11.4    4.0   11.2   11.9   11.7   1.0
--------------------END OF DATA---------------------

ZODIAC: Inner Petosiris (P2)
DECODING VARIANT: Clustered Central Circle, Planet A =
Jupiter, Moon near the autumn equinox point.
CODE OF THE DECODING VARIANT: P61
ORDER OF PLANETS ON THE ECLIPTIC: JUPITER, SUN, VENUS,
MARS, MERCURY, SATURN, MOON

----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
      11.0    5.0    3.0    8.0   11.0   11.0   0.0
# TO: ------------------------------------------#
      1.0    8.0    5.0    1.0    1.0    1.0    2.0
# BEST POINTS: -----------------------------------#
      11.5    6.5    4.0   11.2   11.9   11.7   1.0
--------------------END OF DATA---------------------
-------------------------------------------------

ZODIAC: Inner Petosiris (P2)
DECODING VARIANT: Clustered Central Circle, Planet A =
Saturn, Moon near the spring equinox point.
CODE OF THE DECODING VARIANT: P62
ORDER OF PLANETS ON THE ECLIPTIC: SATURN <-> MOON, SUN,
VENUS, MARS, MERCURY, JUPITER

----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
      11.0    5.0    8.0    3.0   11.0   11.0   0.0
# TO: ------------------------------------------#
      1.0   12.0    1.0    5.0    1.0    1.0    2.0
# BEST POINTS: -----------------------------------#
      11.5   11.2   11.2   4.0   11.9   11.7   1.0
--------------------END OF DATA---------------------

ZODIAC: Inner Petosiris (P2)
DECODING VARIANT: Clustered Central Circle, Planet A =
Saturn, Moon near the autumn equinox point.
CODE OF THE DECODING VARIANT: P63
ORDER OF PLANETS ON THE ECLIPTIC: SATURN, SUN, VENUS,
MARS, MERCURY, JUPITER, MOON

----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
      11.0    5.0    8.0    3.0   11.0   11.0   0.0
# TO: ------------------------------------------#
      1.0    8.0    1.0    5.0    1.0    1.0    2.0
# BEST POINTS: -----------------------------------#
      11.6    6.5   11.2   4.0   11.9   11.7    1.0
--------------------END OF DATA---------------------
-------------------------------------------------

REMARK: The following constellation scale was used (see
section 6.10):
<0>ARIES<1>TAUR<2>GEMINI<3>CANCER<4>LEO<5>VIR<6>
LIB<7>SCORP<8>SAGITT<9>CAPRIC<10>AQUA<11>PISC<12=0>
```

8.4.7 Symbols of Equinoxes, Solstices, Partial Horoscopes and Supplementary Scenes on the Petosiris Zodiac (P2)

In the lower part of the equinoctial beak on the zodiac (P2), there are shown two symbols of equinoxes (see subsections 5.8.1 and 5.8.3).

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(1) A figure of an eye with wings, walking on human legs. It carries a familiar symbol of the spring equinox — a row of cobras looking into one direction. It is located, as it is supposed to, near the constellation of Pisces (see Figure 8.23). Let us recall that the spring equinox point is located in Pisces.
(2) Another symbol of equinox — a creature with four heads, is located near the constellation of Virgo. Notice that the autumn equinox point is also located there (see Figure 8.23).

Partial Horoscopes, with possible exception for the minimal partial horoscope of the spring equinox, are missing on the zodiac (P2). That means, we do not have additional information, which could be helpful for the astronomical dating of the zodiac (P2). Fortunately, we are dealing here with two zodiacs — (P1) and (P2), with the dates that should be close one to another. This situation creates better chances for finding a pair of complete solutions for these zodiacs.

Partial Horoscope of the Spring Equinox on the zodiac (P2) was already discussed above. It is the scene inside the Central Circle: a figure of a boy with a crescent and a disc over his head, that symbolizes the Sun in the main horoscope. The boy holds two vertical snakes in his hands and stands on two crocodiles. This scene most probably symbolizes the minimal horoscope of the spring equinox: the boy — the Sun, two vertical snakes — Mercury, and two crocodiles — Venus (see subsection 8.4.3). Moreover, double representations of Mercury and Venus are quite common on Egyptian zodiacs.

Let us point out that this interpretation has no impact on the actual astronomical dating of the zodiac (P2). As we mentioned it earlier, minimal partial horoscopes do not contain any nontrivial astronomical information (see Chapter 5 for more details). We have discussed these issues here just for the purpose of completeness. Let us conclude that on the zodiac (P2), where the equinoctial constellations are clearly in the center of focus, and the main date (because of the Sun's position) is close to the spring equinox, the appearance of the partial horoscope (although minimal) on the zodiac seems to be very natural.

Finally, on the zodiac (P2), there is a supplementary *Scene in a Boat*. Unfortunately, it contains only a little of information that could be used for the astronomical dating purposes. In this scene, which is located above the top of the *Equinoctial Break*, we see a scarab beetle with spread out wings standing in the center of the boat. The beetle probably represents here the Sun (see Figure 8.23). At the stem of the boat there is shown a figure of lion with a human face (on the photograph included in [5], one can see clearly that this is a human face, but it is difficult to recognize if it is female of male). This figure most probably symbolizes the constellation of Leo. At the stern of the boat, there is standing a human figure. It is hard to recognize from the photograph included in [5] what kind of a head it has — is it a falcon's head or two-faced head? The boat is surrounded from each side by four monkeys walking towards the boat with raised arms. Because of the Leo's presence in the boat, and the fact that it is placed inside the *Equinoctial Break*, this scene is most probably related to the autumn equinox. It could signify that on the autumn equinox day, when the Sun was in Virgo, Venus was on one side of the Sun in Leo, while on the other side was Mars (or Mercury). Let us recall that the figure of lion with human face on the Big Esna zodiac was identified as Venus in a partial horoscope; falcon's head usually symbolized Mars, and two-faced head — Mercury.

If it is a case, then this scene agrees well with one of the obtained by us solutions for the zodiac (P2) — the year 1714 (see for more details below). Since the beginning of the Egyptian year was in September (what presently is in January), in the year corresponding to that solution, the autumn equinox occured in September 1713. On that day Venus was in Leo and Mars was in Libra — on the opposite side of the Sun. This astronomical situation matches well our interpretation of the *Scene in a Boat*. However, because of the poor quality of the picture showing the *Scene in a Boat*, we are not able to identify with certainty the figures in this scene, therefore we did not use this information in the dating process.

In this way, we've completed our discussion of all the figures inside the large circle of the zodiac (P2), which contains the essential part of the zodiac (see Figure 8.23). The figures standing outside the large circle-oval, namely the female figures with wings, birds and stars, are not related to the main date encoded in the zodiac. Therefore, we did not use them for the astronomical dating of the zodiac (P2). Let us point out that these four girls look similar to the female figures surrounding the Round Denderah zodiac. It is possible that the Denderah zodiac was in some sense used as a model for the Petosiris zodiacs.

8.4.8 Astronomical Solutions for the Inner Petosiris Zodiac P2

For the computations of the possible dates shown on the zodiac (P2), we need to consider all the eight variants of decoding for this zodiac. More precisely, there are two variants of interpretation of the Central Circle: the variant of *Dispersed Central Circle* and the variant of *Clustered Central Circle*. For each of these two variants, there are two possible variants of identification of Jupiter and Saturn with the planets denoted by letter s **A** and **C** (see Figure 8.23). In addition, there are also two variants, independent of the previous identifications, for the location of Moon — either at the spring or autumn equinox point. Consequently, we obtain exactly $2^3 = 8$ possible variants of decoding, for which we were using in our computations the codes P50, P51, P52, P53, P60, P61, P62, and P63.

The corresponding to these variants input data for the program HOROS was listed above. Let us now present the results of our computations. For each of the solutions, we show only one date from the acceptable interval consisting of several consecutive days. This date corresponds to the minimal

mean discrepancy from the best points. This minimal mean discrepancy, which we denote by d, is measured in degrees.

1) Variant P50: *Dispersed Central Circle.* **A** = Jupiter, **C** = Saturn. Moon near the spring equinox point.

SOLUTIONS:

April 6, 563 AD., $d = 13.8^o$
April 2, 1714 AD., $d = 11.4^o$

Positions of planets (in degrees) on the ecliptic J2000 Year/Month/Day = 563/4/6						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
37.9^o	7.6^o	131.3^o	357.4^o	49.1^o	44.4^o	52.1^o
Aries	Pisces	Cancer	Pisces	Aries	Aries	Tau/Ari
Mean Distance from the Best Points = 13.8^o						

Table 8.12: *Planetary Positions on March 6, 563*

Positions of planets (in degrees) on the ecliptic J2000 Year/Month/Day = 1714/4/2						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
27.1^o	15.0^o	158.9^o	6.6^o	33.7^o	27.4^o	44.4^o
Pis/Ari	Pisces	Leo	Pisces	Aries	Pis/Ari	Aries
Mean Distance from the Best Points = 11.4^o						

Table 8.13: *Planetary Positions on March 2, 1714*

2) Variant P51: *Dispersed Central Circle.* **A** = Jupiter, **C** = Saturn. Moon near the autumn equinox point.

SOLUTIONS:

April 9, 55 B.C., $d = 6.1^o$
March 27, 563 AD., $d = 9.3^o$

3) Variant P52: *Dispersed Central Circle.* **A** = Saturn, **C** = Jupiter. Moon near the spring equinox point.

NO SOLUTIONS

4) Variant P53: *Dispersed Central Circle.* **A** = Saturn, **C** = Jupiter. Moon near the autumn equinox point.

SOLUTIONS:

Positions of planets (in degrees) on the ecliptic J2000 Year/Month/Day = -54/4/9						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
14.7^o	225.5^o	152.2^o	347.3^o	20.4^o	22.8^o	31.9^o
Pisces	Libra	Leo	Aqu/Pis	Pisces	Pisces	Aries
Mean Distance from the Best Points = 6.1^o						

Table 8.14: *Planetary Positions on March 9, -54*

Positions of planets (in degrees) on the ecliptic J2000 Year/Month/Day = 563/3/27						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
28.2^o	227.9^o	131.1^o	355.2^o	41.9^o	32.1^o	47.9^o
Aries	Libra	Cancer	Pisces	Aries	Aries	Aries
Mean Distance from the Best Points = 9.3^o						

Table 8.15: *Planetary Positions on March 27, 563*

March 30, 418 B.C., $d = 18.2^o$
April 7, 275 B.C., $d = 15.2^o$

Positions of planets (in degrees) on the ecliptic J2000 Year/Month/Day = -417/3/30						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
37.1^o	221.6^o	30.8^o	122.2^o	37.2^o	41.6^o	56.6^o
Aries	Libra	Aries	Cancer	Aries	Aries	Taurus
Mean Distance from the Best Points = 18.2^o						

Table 8.16: *Planetary Positions on March 30, -417*

Positions of planets (in degrees) on the ecliptic J2000 Year/Month/Day = -274/4/7						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
44.2^o	225.0^o	340.9^o	142.1^o	49.4^o	46.7^o	56.7^o
Aries	Libra	Aquar	Can/Leo	Ari/Tau	Aries	Taurus
Mean Distance from the Best Points = 15.2^o						

Table 8.17: *Planetary Positions on April 7, -274*

5) Variant P60: *Clustered Central Circle.* **A** = Jupiter, **C** = Saturn. Moon near the spring equinox point.

SOLUTIONS:

April 5, 563 AD., $d = 14.5^o$
March 23, 1240 AD., $d = 12.9^o$
April 2, 1714 AD., $d = 14.2^o$

Positions of planets (in degrees) on the ecliptic J2000 Year/Month/Day = 563/4/5						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
36.9^o	353.3^o	131.3^o	357.2^o	48.4^o	43.2^o	52.1^o
Aries	Pisces	Cancer	Pisces	Aries	Aries	Ari/Tau
Mean Distance from the Best Points = 14.5^o						

Table 8.18: *Planetary Positions on April 5, 563*

Positions of planets (in degrees) on the ecliptic J2000 Year/Month/Day = 1240/3/23						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
20.8^o	1.2^o	124.1^o	17.7^o	424.6^o	23.9^o	36.1^o
Pis/Ari	Pisces	Leo	Pisces	Aries	Pis/Ari	Aries
Mean Distance from the Best Points = 14.2^o						

Table 8.19: *Planetary Positions on March 23, 1240*

6) Variant P61: *Clustered Central Circle.* **A** = Jupiter, **C** = Saturn. Moon near the autumn equinox point.

SOLUTIONS:

Positions of planets (in degrees) on the ecliptic J2000 Year/Month/Day = 563/3/27						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
28.2^o	227.9^o	131.1^o	355.2^o	41.9^o	32.1^o	47.9^o
Pis/Ari	Libra	Cancer	Pisces	Aries	Aries	Aries
Mean Distance from the Best Points = 11.0^o						

Table 8.20: *Planetary Positions on March 27, 563*

7) Variant P62: *Clustered Central Circle.* **A** = Saturn, **C** = Jupiter. Moon near the spring equinox point.

NO SOLUTIONS

8) Variant P63: *Clustered Central Circle.* **A** = Saturn, **C** = Jupiter. Moon near the autumn equinox point.

SOLUTIONS:

Positions of planets (in degrees) on the ecliptic J2000 Year/Month/Day = -274/4/7						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
44.2^o	225.0^o	340.9^o	142.1^o	49.4^o	46.7^o	56.7^o
Aries	Libra	Aquar	Can/Leo	Ari/Tau	Aries	Taurus
Mean Distance from the Best Points = 16.9^o						

Table 8.21: *Planetary Positions on April 7, -274*

In this way, we have obtained several solutions for the zodiac (P2), which are scattered all over the historical time interval. It was not an unexpected outcome — in the case of the zodiac (P2), we did not have partial horoscopes or additional astronomical information that could be used for validation of solutions. The astronomical contents of the zodiac P2 is rather "poor." Moreover, its decoding is not unique. In the case of multiple variants of decoding there is also increase in the number of possible astronomical solutions.

Therefore, in order to choose the correct date from the set of obtained solutions, we will need to compare them with the astronomical solutions for the zodiac (P1). The fact that the both zodiacs (P1) and (P2) were found in the same tomb, allows us to expect that their dates should be close one to another. It is possible that the dates commemorated in these zodiacs are related to the birth and death of the buried in the tomb person. In the case of the Petosiris tomb, based on the pictures painted on its walls, it is reasonable to expect that it contains a body of a middle-age man, who was probably killed in a battle (see beginning of the section 8.4). That means the difference between the dates of the zodiacs P1 and P2 should be in the interval from 20 to 60 years.

Let us proceed with the decoding of the date on the zodiac (P1).

8.4.9 Constellations and Planetary Figures on the Outer Petosiris Zodiac P1

A detailed drawing of the Outer Petosiris zodiac (P1) was shown on Figure 8.22. The planets on this zodiac are represented by the same symbols as on the zodiac (P2) (see subsection 8.4.3). Unfortunately, a large portion of the zodiac (P1) was destroyed. On Figure 8.22, which was taken from [5], there are the annotations **A, B, C, D, G, F** around the preserved fully or partially planetary symbols. They were

made by the authors of [5]. From these annotation it follows clearly the following identification:

Venus — the planet **B**. It is a bust of a female, exactly the same as on the zodiac (P2). It is located the area that can be associated with Taurus and Gemini, but also possibly with Aries.

Moon — the planet **F**. It is a bust of a female on a crescent, which is exactly the same as on the zodiac (P2). It is located between Aries and Taurus. In contrast to the other planets, it is placed among the constellation figures.

Jupiter and Saturn — the planets **A** and **C**. There are shown as male busts, wearing tunics, which are very similar to the representations of Jupiter and Saturn on the zodiac (P2). We have the same problem with the identification of these two planets as it was in the case of the zodiac (P2). It is impossible to determine definitely which one of the planets **A** and **C** is Saturn and which one is Jupiter. They look very similar. Therefore, we have to consider again two possible variants of identification of these two planets. The planet **A** is shown in Aries, Pisces or Aquarius, while the planet **C** is in Capricorn, Sagittarius or Scorpio (see Figure 8.22).

The only bust shown in profile is the planet **D**. It should be **Mercury** — exactly like it was on the zodiac (P2). This figure on the zodiac (P1) is almost completely destroyed. Only a small portion of the head, most probably two-faced, survived[15]. On the drawing shown on Figure 8.22, it is very clear that figure representing the planet **C** is shown from profile. It is also clear that is located on the right from Scorpio, i.e. either in Libra or Virgo.

The place on the zodiac (P1), where the figure representing Mars should be located, was annotated by the authors of [5] by the letter **G**. It is just in front of Gemini (see Figure 8.22). The authors of [5] wrote: *"Nothing preserved of Mars,"* but according to the drawing of the zodiac P1 (see Figure 8.22) the symbol of Mars could be located not only in Gemini, but also in Virgo, Leo or Cancer. It is clear that this figure couldn't fit into the space near other constellations.

The symbol of the **Sun** is missing on the zodiac (P1). We have to assume that it was located somewhere in the destroyed part of the zodiac, i.e in the area of the constellations Scorpio, Libra, Virgo, Leo, Cancer, and Gemini.

8.4.10 The Main Horoscope and the Supplementary Scenes on the Outer Zodiac P1

Consequently we obtain the following decoding of the main horoscope on the zodiac (P1):

- Venus — in Aries, Taurus or Gemini. The "Best Point" for this planet is on the boundary between Aries and Taurus. The order of this planet is interchangeable with Moon.
- Moon — in Aries or Taurus. The "Best Point" is on the boundary between Aries and Taurus. Moon is interchangeable with Venus.
- Jupiter (or Saturn) — the planet **A** in Aries, Pisces, or in Aquarius. The "Best Point" — the border between Aries and Taurus.
- Saturn (or Jupiter) — the planet **C** in Capricorn, Sagittarius or Scorpio. The "Best Point" — the border between Sagittarius and Scorpio.
- Mercury — in Libra or Virgo. The "Best Point" — the border between Libra and Virgo.
- Venus — in Aries or Cancer.
- Mars — in Virgo, Leo, Cancer or Gemini. The "Best Point" — in the middle of Gemini (also confirmed by the authors of [5]).
- Sun — in Scorpio, Libra, Virgo, Leo, Cancer or Gemini. However, in our computations we did not impose any restriction on the Sun location. As the matter of fact, the position of the Sun can not be too far from Venus and Mercury, so it is clear that its location should be somewhere in between these two planets. Otherwise, the distance between the Sun and Venus, or between the Sun and Mercury would be too big to be astronomically possible. Consequently, we obtain that the location of the Sun on the zodiac (P1) should be somewhere in its destroyed portion, exactly where we expected it to be (see subsection 8.4.9). In fact, it is not possible that the Sun to be located in a different location, thus it was not even necessary to verify that its location was in the appropriate constellation listed above.

In this way, we obtain two variants of decoding for the main horoscope, which was using as the input data for the program HOROS:

```
ZODIAC: Outer Petosiris (P1)
CODE OF THE DECODING VARIANT: PSR
PLANET A = JUPITER
----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
       0.0    0.0    7.0   10.0    2.0    0.0   5.0
# TO: ------------------------------------------#
     12.0    2.0   10.0    1.0    6.0   3.0    7.0
# BEST POINTS: ----------------------------------#
      200    1.0    8.0   11.0    2.5    1.0   6.0
-------------------END OF DATA--------------------
------------------------------------------------------

ZODIAC: Outer Petosiris (P1)
CODE OF THE DECODING VARIANT: PSS
PLANET A = SATURN

----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
       0.0    0.0   10.0    7.0    2.0    0.0   5.0
# TO: ------------------------------------------#
     12.0    2.0    1.0   10.0    6.0   3.0    7.0
# BEST POINTS: ----------------------------------#
```

[15] See [5], p. 96.

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```
      200     1.0    11.0    8.0     2.5     1.0    6.0
--------------------END OF DATA---------------------
REMARK: The following constellation scale was used (see
section 6.10):
<0>ARIES<1>TAUR<2>GEMINI<3>CANCER<4>LEO<5>VIR<6>
LIB<7>SCORP<8>SAGITT<9>CAPRIC<10>AQUA<11>PISC<12=0>
```

There are no other supplementary astronomical scenes on the zodiac (P1). The astronomical content of the zodiac (P1) is limited to its main horoscope.

Let us notice that the Egyptian symbol of 𓂀-eye that is located above the female bust representing Moon (see Figure 8.22) can not be helpful either in the selection process of the admissible solutions. As we have mentioned it earlier, this symbol was used to annotate the planets that were not far from the star Alpha Aries, called also Eye of Aries. By the way, the location of this symbol agrees very well with the astronomical picture shown on the zodiac. Indeed, Moon with the symbol of 𓂀-eye is located exactly at the border between Aries and Taurus. That means that, because of its relatively fast motion, Moon during the days corresponding to the astronomical solution had to pass by the star Eye of Aries.

8.4.11 Astronomically Possible Dates for the Zodiac P1

Let us list all astronomically possible solutions for the date encoded in the zodiac (P1). For each of the obtained solutions, which usually corresponded to several consecutive days, we have selected only one date for which the mean discrepancy from the best points was minimal (see section 6.11). The mean discrepancy (distance) d from the best points is specified (in degrees) for each of the listed below solutions.

The First Variant of Decoding (the code of decoding — PSR). The planet **A** = Jupiter.

SOLUTIONS:

August 4, 459 B.C., $d = 38.1^o$
July 17, 457 B.C., $d = 49.8^o$
July 28, 339 B.C., $d = 24.5^o$

August 8, 76 AD., $d = 25.3^o$
August 14, 279 AD., $d = 26.4^o$
August 1, 693 AD., $d = 27.9^o$
July 26, 813 AD., $d = 33.3^o$
August 5, 1227 AD., $d = 29.6^o$
August 11, 1430 AD., $d = 29.4^o$
August 2, 1667 AD., $d = 34.7^o$
August 21, 1844 AD., $d = 29.5^o$

The Second Variant of Decoding (the code of decoding — PSR). The planet **A** = Saturn.

SOLUTIONS:

July 30, 845 AD., $d = 18.2^o$
August 14, 1641 AD., $d = 35.6^o$
August 27, 1876 AD., $d = 29.4^o$
August 6, 1878 AD., $d = 35.9^o$

8.4.12 Astronomical Dating of the Pair of the Zodiacs (P1) and (P2)

Let us list, in the ascending order, all the obtained in subsection 8.4.8 dates for the zodiac (P2). We will compare them with the just obtained dates for the zodiac (P1) and we will select those pairs for which the difference is smaller than 100 years (i.e. could be considered as a lifespan of a certain person). However, as we have explained it earlier, a particular attention will be given to the pairs with the difference that can be related to a lifespan of a middle-aged man, i.e. between 20 and 60 years.

All the possible dates for the zodiac P2 are the following (see subsection 8.4.8 for more discussion related to the computations of these dates):

March 30, 418 B.C., $d = 18.2^o$
April 7, 275 B.C., $d = 15.2$ or $d = 16.9^o$
April 9, 55 B.C., $d = 6.1^o$

March 27, 563 AD., $d = 9.3^o$ or $d = 11.0^o$
April 5, 563 AD., $d = 14.5^o$
April 6, 563 AD., $d = 13.8^o$
March 23, 1240 AD., $d = 12.9^o$
April 2, 1714 AD., $d = 14.2^o$ or $d = 11.4^o$

By comparing this list with the list of all possible dates for the zodiac (P1) (see subsection 8.4.11), we realize that there are possible only three pairs of the dates with the difference between them smaller than 100 years. Among those three pairs, there is only one pair with the difference larger than 20 years and smaller than 60 years. That means, there is only one ideal pair of solutions for the Petosiris zodiacs:

August 2, 1667 AD., for the zodiac P1, and
April 2, 1714 AD., for the zodiac P2

The difference between these two dates is 47 years, which fits very well the possible age of the killed in a battle warrior shown on the walls in the Petosiris tomb (see Figures 8.21 and 8.26).

The positions of planets on the ecliptic J2000 for the solution April 2, 1714, which was obtained for the zodiac (P2), were presented in Table 8.13. Let us list the positions of planets for the solution August 2, 1667 for the zodiac (P1). Notice that there is a very good correspondence between these positions and the astronomical picture shown on the zodiac (P1) (see Figure 8.22).

Let us point out that in the case of the zodiac (P1), the mean distance from the best points can only serve as a rough

Positions of planets (in degrees) on the ecliptic J2000 Zodiac (P1), Code of Decoding — PSR Year/Month/Day = 1714/4/2						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
144.2^o	62.5^o	301.6^o	40.0^o	120.1^o	118.0^o	169.9^o
Can/Leo	Taurus	Sag/Cap	Aries	Gem/Can	Gem/Can	Leo
Mean Distance from the Best Points = 34.7^o						

Table 8.22: *Planetary Positions on April 2, 1714*

Positions of planets (in degrees) on the ecliptic J2000 Zodiac (P1), Code of Decoding — PSR Year/Month/Day = 1227/8/5						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
149.8^o	56.4^o	325.1^o	356.7^o	135.1^o	104.6^o	176.2^o
Leo	Taurus	Capric	Aquar	Cancer	Gemini	Leo/Vir
Mean Distance from the Best Points = 34.7^o						

Table 8.23: *Planetary Positions on August 5, 1227*

indicator of the quality of the obtained astronomical solution. As a matter of fact, the locations of the planetary symbols with respect to the constellation figures on the zodiac (P1) are only indicated approximatively, so it is not surprising that the "best points" are determined with accuracy about 1–2 zodiacal constellations. For the same reason the mean discrepancy from the best points for this solution is rather large — 34.7^o, which is about to times larger than in the case of other Egyptian zodiacs (for example the zodiac (P2)).

For the purpose of completeness, let us also present two other pairs of solutions, for which the difference between the dates was less than 100 years.

August 4, 459 B.C., or July 17, 457 B.C., or July 28, 339 B.C.
(for the zodiac (P1))

March 30, 418 B.C. (for the zodiac (P2))

Nevertheless, this solution is much too early, even from the point of view of the Scaliger chronology, which claims that the symbols of zodiacal constellations (such as they appear on the both Petosiris zodiacs) appeared in Egypt not earlier than the 1st century B.C. In addition, this dates contradict the all obtained by us dates for the other Egyptian zodiacs. Consequently, this pair should be rejected.

August 5, 1227 A.D. (for the zodiac (P1))

March 23, 1240 A.D. (for the zodiac (P2))

The positions of the planets on the ecliptic on the date March 23, 1240 A.D. were as follows:

From the astronomical point of view, this solution is ideal. On the other hand, this pair matches the dates obtained for the other Egyptian zodiacs. Therefore, in principle those could be the true dates for the Petosiris tomb. However, there is a problem with the age of the person buried inside the tomb. According to the dates obtained for this solution, this could be a teenage boy only 13 years old. Since the murals inside the Petosiris tomb clearly indicate that this was a burial place of a warrior, from this point of view the pair of dates 1667–1714 is a better one.

8.4.13 Dating of the Petosiris Zodiac Under Weaker Requirements

Let us return to the decoding of the zodiac (P2) in the case of the *Clustered Central Circle*, and consider it again, but this time, under weaker requirements. Let us point out some particularities in the design of the small oval, which we call the Central Circle (see Figure 8.22). The Sun is shown here in the center as the main source of light, while two other planets (its "subordinates") are shown on its sides. This type of a picture is typical for many "ancient" Egyptian monuments. That means, this could be a symbolic representation of an astronomical situation, where the real order of planets was not necessarily the same as it appears.

In this way, we should consider one more variant, in which the order of the planets inside the Central Circle on the zodiac (P2) can be arbitrary. For this purpose, we will modify the input data with the codes P60–P63, so the constrains on the order of the planets inside the Central Circle and Moon (in the case when it is located near the spring equinox point) are removed. These modified input files for the program HOROS are presented below. We annotated them with the codes P40–P43.

```
ZODIAC: Inner Petosiris (P2)
DECODING VARIANT: Clustered Central Circle, Planet A =
Jupiter, Moon near the spring equinox point.
CODE OF THE DECODING VARIANT: P40
ORDER OF PLANETS ON THE ECLIPTIC: JUPITER <-> MOON
<->SUN <-> VENUS, MARS, MERCURY, SATURN

----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
      11.0   10.0    3.0    8.0   11.0   11.0   0.0
# TO: ------------------------------------------#
      1.0   12.0    5.0     1.0    1.0   1.0    2.0
# BEST POINTS: ----------------------------------#
      11.5   11.5    4.0   11.5   11.9   11.5   1.0
--------------------END OF DATA---------------------
------------------------------------------------------

ZODIAC: Inner Petosiris (P2)
DECODING VARIANT: Clustered Central Circle, Planet A =
Jupiter, Moon near the autumn equinox point.
CODE OF THE DECODING VARIANT: P41
```

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```
ORDER OF PLANETS ON THE ECLIPTIC: JUPITER <-> SUN <->
VENUS, MARS, MERCURY, SATURN, MOON

----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
      11.0    5.0    3.0    8.0   11.0   11.0   0.0
# TO: ------------------------------------------#
      1.0    8.0    5.0     1.0    1.0   1.0    2.0
# BEST POINTS: -----------------------------------#
      11.5    6.5    4.0   11.5   11.9   11.5   1.0
--------------------END OF DATA---------------------
-----------------------------------------------------

ZODIAC: Inner Petosiris (P2)
DECODING VARIANT: Clustered Central Circle, Planet A =
Saturn, Moon near the spring equinox point.
CODE OF THE DECODING VARIANT: P42
ORDER OF PLANETS ON THE ECLIPTIC: SATURN <-> MOON <->SUN
<-> VENUS, MARS, MERCURY, JUPITER

----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
      11.0    5.0    8.0    3.0   11.0   11.0   0.0
# TO: ------------------------------------------#
      1.0   12.0    1.0     5.0    1.0   1.0    2.0
# BEST POINTS: -----------------------------------#
      11.5   11.5   11.5   4.0   11.9   11.5   1.0
--------------------END OF DATA---------------------

ZODIAC: Inner Petosiris (P2)
DECODING VARIANT: Clustered Central Circle, Planet A =
Saturn, Moon near the autumn equinox point.
CODE OF THE DECODING VARIANT: P43
ORDER OF PLANETS ON THE ECLIPTIC: SATURN <->SUN <->
VENUS, MARS, MERCURY, JUPITER, MOON

----------------------DATA-------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
      11.0    5.0    8.0    3.0   11.0   11.0   0.0
# TO: ------------------------------------------#
      1.0    8.0    1.0     5.0    1.0   1.0    2.0
# BEST POINTS: -----------------------------------#
      11.5    6.5   11.5   4.0   11.9   11.5    1.0
--------------------END OF DATA---------------------
-----------------------------------------------------

REMARK: The following constellation scale was used (see
section 6.10):
<0>ARIES<1>TAUR<2>GEMINI<3>CANCER<4>LEO<5>VIR<6>
LIB<7>SCORP<8>SAGITT<9>CAPRIC<10>AQUA<11>PISC<12=0>
```

As before, we will be looking for the pairs of dates for the zodiacs (P1) and (P2), such that their difference is not larger than 100 years.

By applying the modified input files we obtain the following three additional, to the previously obtained, pairs of solutions:

July 28, 339 B.C., (for the zodiac (P1))

March 18, 292 B.C. (for the zodiac (P2))

August 14, 279 A.D., (for the zodiac (P1))
April 4 or 15, 326 A.D. (for the zodiac (P2))

and

August 11, 1430 A.D., (for the zodiac (P1))
March 31 or April 11, 1477 A.D. (for the zodiac (P2))

The first two pairs of solutions are much too far away from the other dates obtained for the Egyptian zodiacs, so we decided to reject them. In the case of the third pair of solutions, which points out at the 15th century, such dates are possible in general. However, let us recall that these solutions were obtained under much weaker order requirements, and from this point of view they should be considered as less acceptable than the other solutions. We will consider this pair as conditional solutions for the zodiacs (P1) and (P2).

Let us list the position of the planets on the ecliptic on August 11, 1430 (compare it with the planetary position on the zodiac (P1) shown on Figure 8.22):

Positions of planets (in degrees) on the ecliptic J2000 Zodiac (P1) Year/Month/Day = 1430/8/11						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
154.6^o	69.8^o	285.7^o	48.0^o	125.1^o	110.2^o	181.4^o
Leo	Taurus	Sagitt	Aries	Cancer	Gem/Can	Virgo
Mean Distance from the Best Points = 31.1^o						

Table 8.24: *Planetary Positions on August 11, 1430*

8.4.14 Conclusions

In this way we can conclude that the Petosiris Tomb was most probably created in the year 1714 A.D. (i.e. in the 18th century) as the burial place for a an important warrior (of the age 47 years), which was killed in a battle. Let us recall that in the 18th century Egypt was ruled by Mameluks. So, it is quite possible that this place was a grave of a Mameluk. Moreover, if the Petosiris tomb was indeed build in the 18th century, than this could clarify why its so-called "late" style that does not resemble typical "ancient" Egyptian compositions — because it belongs the 18th century. Let us point out that from the astronomical point of view this pair of solutions fits perfectly the pictures shown on the zodiacs (P1) and (P2).

The second pair of solutions, which we consider much less probable, indicates that the Petosiris Tomb could be built in the year 1240 A.D. (i.e. during the 13th century). But in this case, the person buried there was just a teenage boy of the age

13 (born in 1227). In this case, there would be a no relations to the paintings decorating the walls of the tomb. However, from the astronomical point of view this solutions are also ideal.

Finally, the third possibility (under relaxed astronomical requirements) could be the pair of solutions referring to the 15th century. In this case the occupant of the Petosiris tomb would be a person of the age 47, that was born in 1430 and died (or was killed) in 1477 A.D. However, from the astronomical point of view these solutions are not as good as the previous ones.

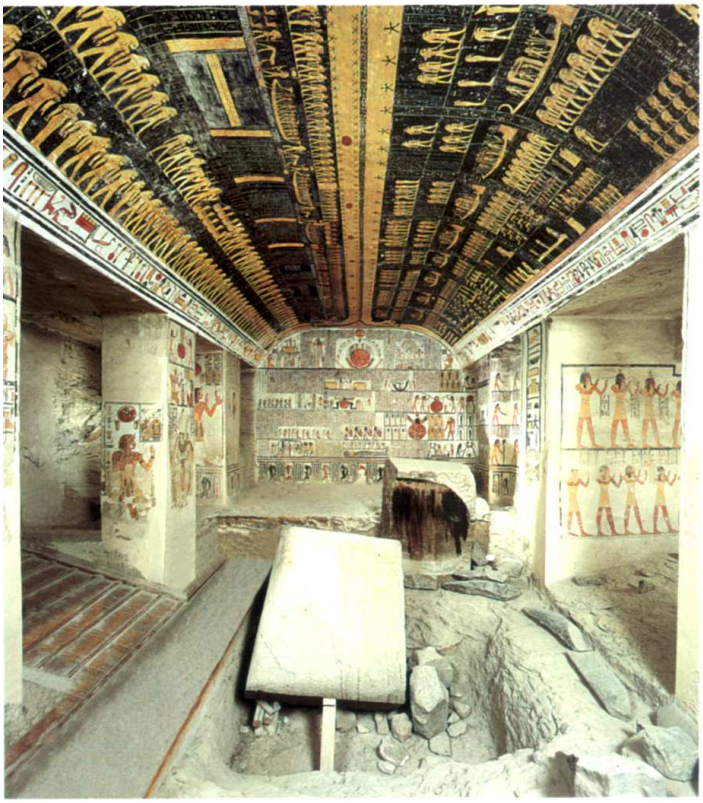

Figure 8.30: *The burial chamber in the tomb of Ramses VI with the zodiac on the ceiling.*

8.5 Dating of the Zodiac from the Tomb of Ramses VI

In this section we will analyze for the purpose of the astronomical dating the Egyptian zodiacs found in the tomb of Ramses VI.

8.5.1 The Tomb of Ramses VI and Its Zodiac

The tomb of Ramses VI is located in the Valley of the Kings. Right in the middle of this valley there is an isolated rocky hill looking by coincidence like a mound constructed over a burial site. Inside this hill, there were several tombs hewn in the rock, among them — the tomb of Ramses VI. In Chapter 7, on Figure 7.2 included a photograph of this site and on Figure 7.3 we show the entrance to the tomb of Ramses VI.

It is believed that the tomb of Ramses VI was already well-known during the "ancient" times, and it was attracting many visitors[16]. However, this tomb was excavated again in the year 1888 — its chambers were blocked by rubble and rock debris. Presently, for some reasons this tomb is closed for visitors. On Figure **??** we show the plan of this magnificent tomb.

It is assumed that initially this tomb was designated for the previous Pharaoh Ramses V, who eventually was buried there. Later the tomb was expanded and Ramses VI was also buried there as well[17]. In this tomb, there was discovered one of the most impressive Egyptian zodiacs, which was painted on the ceiling of the burial chamber right above the sarcophagus of the pharaoh. A color photograph of this zodiac was shown on 2.36. A general view of the burial chamber inside the Ramses VI tomb, with the zodiac on its ceiling, is shown on Figure 8.30, and the zodiac itself on Figure 8.32. Let us recall that we denote this zodiac by the symbol (RS) and we will simply call it the *Ramses VI zodiac*.

As we are going to explain in this section, the Ramses VI zodiac (RS) contains a main hororoscope, which can be decoded and dated astronomically. The horoscope is contained in the part of the zodiac, which is shown on Figure 8.32. We will call it the *Lower Part* of the zodiac. Inside the Lower Part, on the left half of it shown on Figure 8.33, one can find symbols of almost all the planets from the main horoscope, except Moon, which is shown in the right half of the Lower Part. In fact, the Sun and Moon on the Ramses VI zodiac are indicated by colors only.

Let us present the details of the analysis of the zodiac (RS).

8.5.2 Zodiacal Constellations Symbols on the Zodiac (RS)

We will discuss in this subsection the Lower Part of the zodiac (RS) only, which contains the sufficient information needed for the decoding of the Ramses VI zodiac (RS). The Upper Part of the zodiac, does not contain any element of the main horoscope. Moreover, it seems that on the zodiac (RS) there are no partial horoscopes present as well, at least we were not able to identify them.

[16] See [180] page 64.
[17] See [180], page 64.

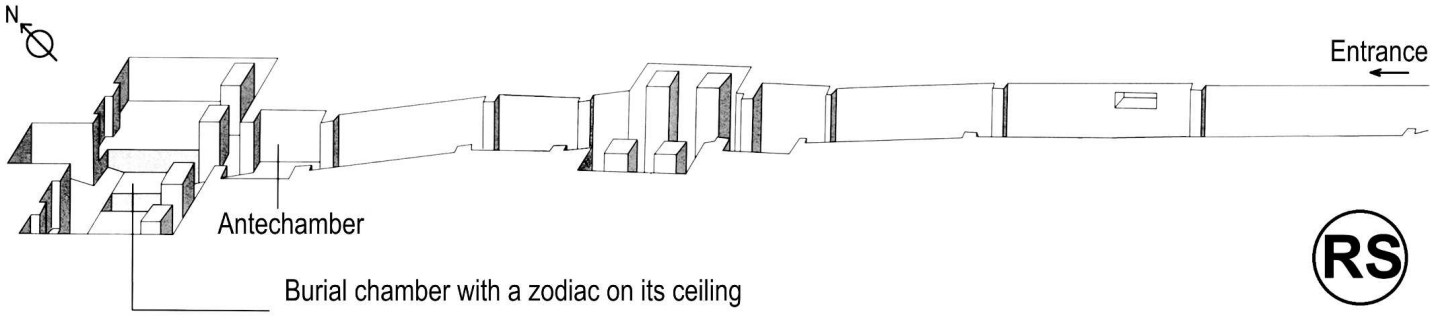

Figure 8.31: *Plan of the tomb of Ramses VI located in the Valley of the Kings.* (The picture was taken from [180])

In order to explain the structure of the zodiac (RS), let us point out that the Lower Part of the zodiac is divided into 12 sectors,which are separated by vertical "lines." It comes immediately to mind that we have here a symbolic representation of the ecliptic divided into 12 zodiacal constellations. All these constellations are shown as the vertical sectors in the Lower Part of the zodiac (RS). Of course, we need to recognize for each zodiacal constellation, what is the corresponding sector on the zodiac. Since we do not find here even one usual symbol of a zodiacal constellation, which waqs used on the other Egyptian zodiac, it is not a trivial problem. Nevertheless, it is possible to give the answer to this question. In fact, there is only one way the constellations on the Ramses VI zodiac can be recognized.

Notice that in the first 11 sectors of the zodiac, beginning from the head of the goddess Nut, all the figures are arranged in sequences indicating the same common direction. In each of these sector there is a large boat. However, the 12th sector, which is the sector right next to the goddess Nut legs, is different. Instead of one large boat, there are two small boats in vertical positions — contrary to the boats in the other 11 sectors, which are shown horizontally (see Figure 8.32). These 11 boats are most probably the symbols of the zodiacal constellations, and since the 12th sector contains two identical boats, it comes to mind that it could be Gemini. Of course, we would like to have a confirmation for this identification of Gimini. Notice that in the 12th sector, under the symbols of two boats, there are two human figures holding hands. There is also a disc resting on their hands. It is not hard to see that it is a typical symbol of Gemini, which is in fact very similar to the figure of Gemini on the Long Denderah zodiac (See Figures 5.4 and 5.5). On the other hand, above the boats there is a typical symbol of the summer solstice — the Sun on the pole. We have seen similar symbols on other Egyptian zodiacs. For example, on the Denderah zodiacs, there was a bird sitting on a pole (see section 5.8.4). Here, the Sun is symbolized by a beetle sitting on the pole[18], which can be interpreted as the point of the heighest elevation of the Sun. It is clear that it has to be the summer solstice point.

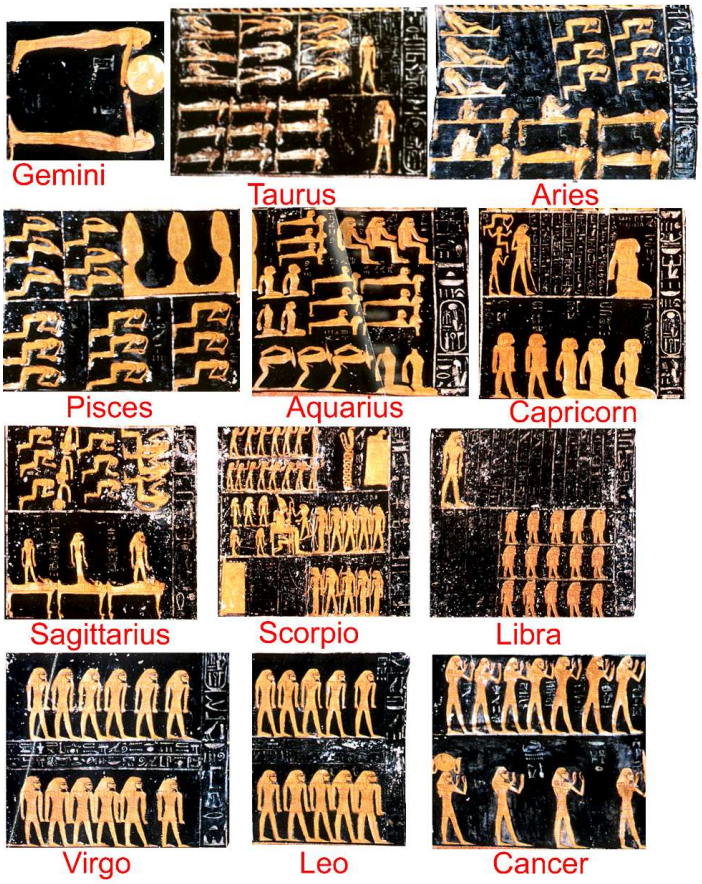

Figure 8.34: *Symbols of the zodiacal constellations on the Ramses VI zodiac (RS).*

As we have already explained in Chapter 5, on the Egyptian zodiacs, the summer solstice was always shown in Gemini. Consequently, the last sector of the zodiac could be indeed Gemini, which implies that the other 11 sectors should symbolize the remaining 11 zodiacal constellations. There more arguments in support of this claim.

Let us continue our analysis of the Ramses VI zodiac. If Gemini is indeed the last sector on the right, then there are exactly two possible ways all the remaining 11 constellation

[18] See [182], p.84.

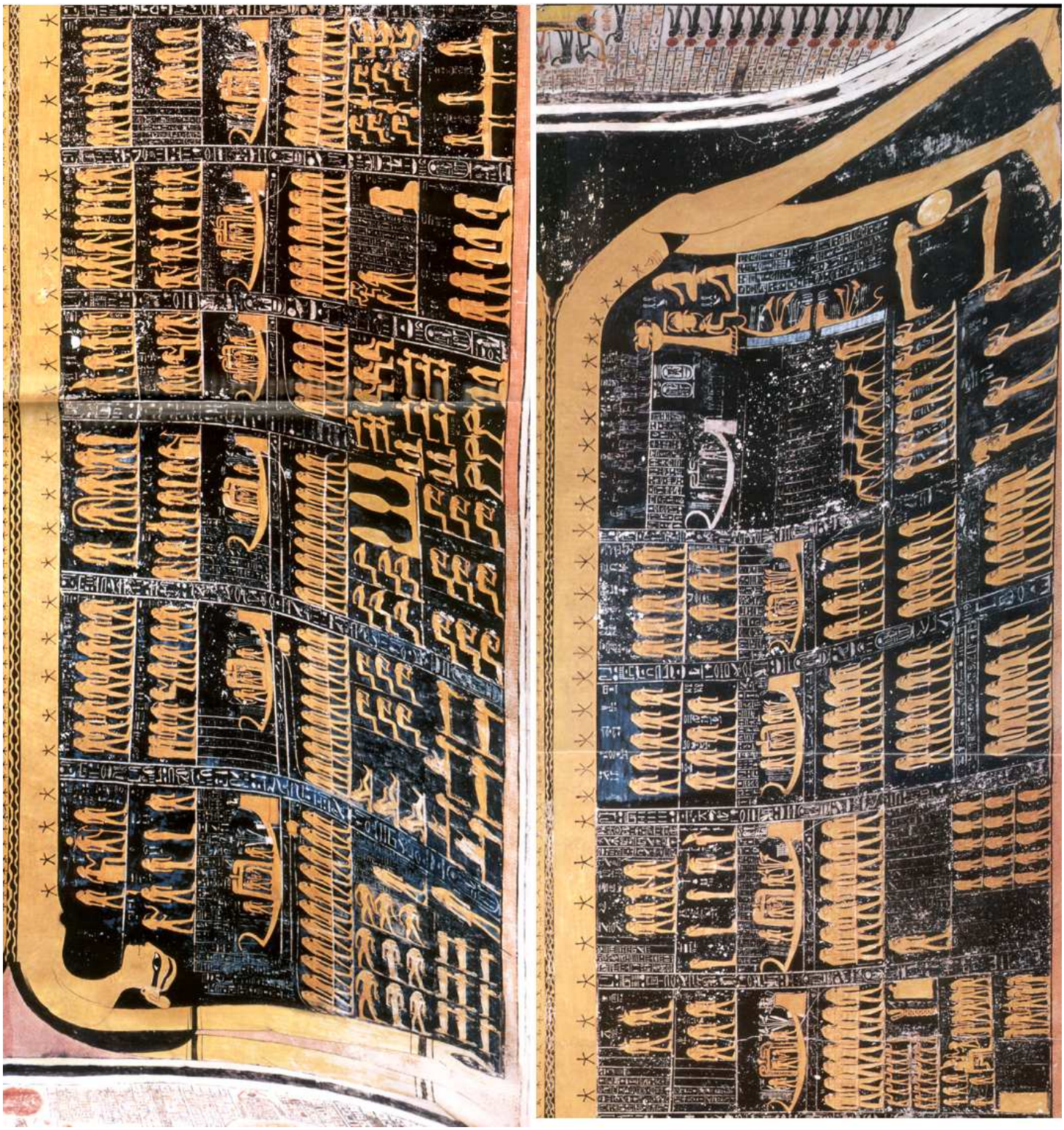

Figure 8.32: *The Lower Part of the Ramses VI zodiac containing the main horoscope. The zodiac was cut in the middle to fit better this page.* (The picture was taken from [181])

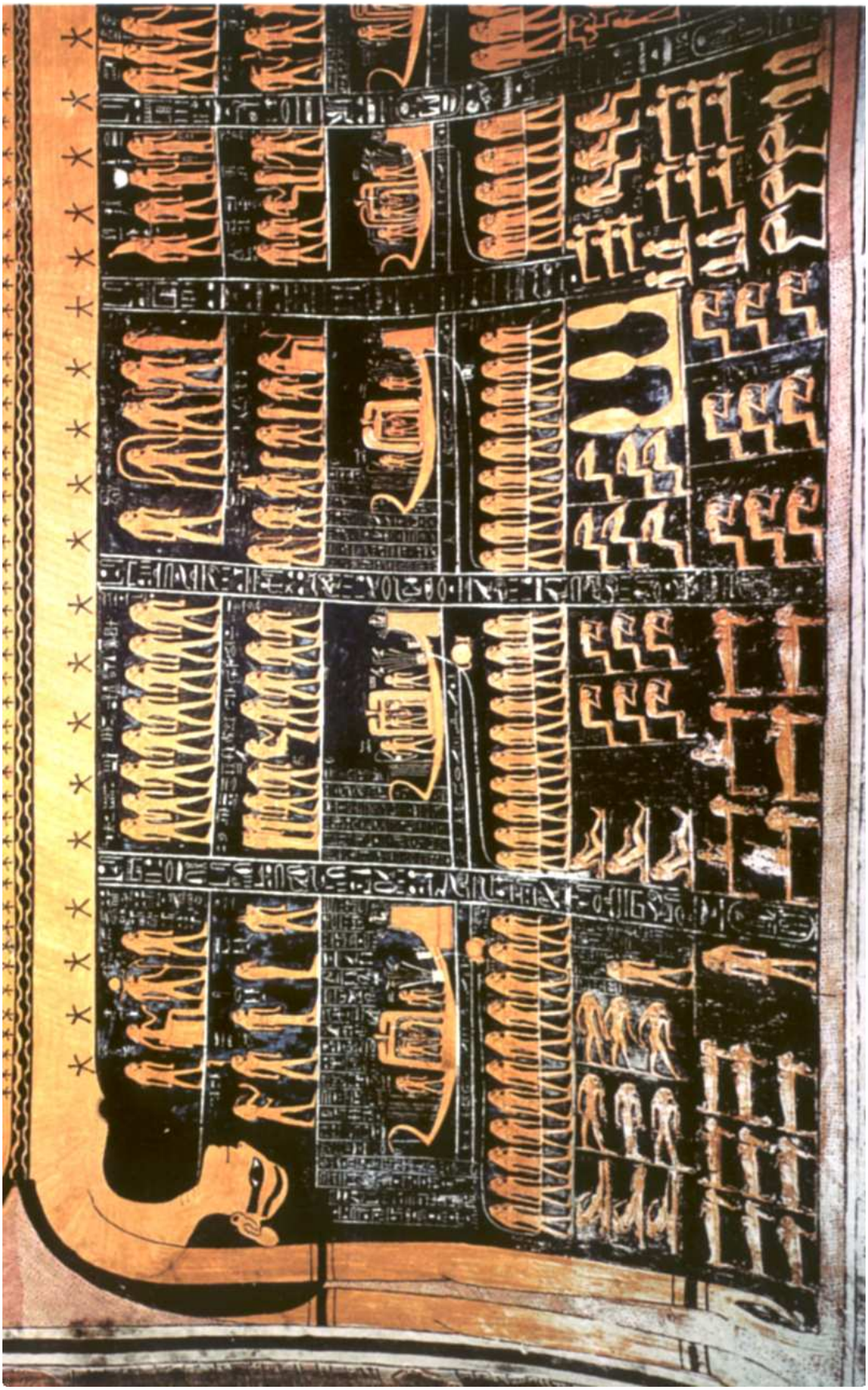

Figure 8.33: *The left hand side of the Lower Part of the Ramses VI zodiac containing the main horoscope. In this part there are shown all the planets of the main horoscope.* (The picture was taken from [181])

can be identified. In fact, the sector preceding it should correspond to neighboring with Gemini constellation, which in this case would be Taurus or Cancer. Consequently, there are exactly two variants of identification that can be applied here. In order to obtain a definite and unique identification, we need to recognize one more constellation on the zodiac (RS). Notice that in the same time we will also obtain a confirmation of the correctness of the identification of Gemini in the far right sector on the zodiac.

It turns out that this task can be achieved. In fact, all the needed for this analysis information was already obtained in the case of the Small Esna zodiac (EM) (see subsection **??**). Noticed kneeling beheaded figures on the Small Esna (see right Aquarian bracket on Figures 7.43 and 7.42). These were the symbols associated with Aquarius. Exactly the same symbols we find on the Ramses VI zodiac, in its Lower Part (see Figure 8.33). These figures are located at the bottom of the forth from the left sector of the zodiac (RS). Therefore, it would be either the forth or eight constellation from Gemini, which was recognized earlier. But this is exactly how the constellations of Gemini and Aquarius are placed on the real sky, and we can consider this as a confirmation of our identification.

Consequently, we have obtained the following unique identification of the zodiacal constellations on the Ramses VI zodiac:

(1) The boats on the zodiac (RS) symbolize the twelve zodiacal constellations,
(2) In the 12th sector, the constellation of Gemini is symbolized by a pair of identical boats and two human figures holding hands (see Figure 8.32),
(3) The boat in the forth sector from the left symbolizes the constellation of Aquarius.

Based on the above identification, we can recognize in a unique way all the remaining zodiacal constellations symbolized on this remarkable Egyptian zodiac. Let us point out, that we are not aware of any earlier research devoted to decoding of the astronomical symbolizm on the Ramses VI zodiac. The astronomical symbolizm of the Ramses VI zodiac is new to us. On Figure 8.34 we show the symbols related to the zodiacal constellations. Let us shortly describe their main featutes:

- **Taurus** — there are three hieroglyphs in the upper left corner of the Taurus area (see Figure 8.34), which look like human figures about to "lay down on a bed." There are also nine hieroglyphs — "laying dead bodies," and six walking figures.
- **Aries** — there are three hieroglyphs in the upper left corner of this area, shown as human figures "getting up from a bed," below them there are three figures "sitting on beds," and three dead bodies. In the upper right corner, there are three figures-hieroglyphs, "braiding their hair."
- **Pisces** — there are six hieroglyphs composed of "beheaded sitting figures," which are located in the upper left corner of this area (these figures shouldn't be mistaken for symbols of Aquarius — they are sitting instead of kneeling), then there are nine figures-hieroglyphs "braiding their hair," and finally a large hieroglyph in a shape of a "trident."
- **Aquarius** — on the left there are four "kneeling figures," one of them is beheaded, which is a familiar symbol associated with Aquarius. In the lower right corner, there are two more "kneeling beheaded figures." Further to the left, there are three hieroglyphs represented by three 'bended forward" male figures, about "being beheaded." Finally, there are nine looking like Sphinx figures laying on beds, and three figures "sitting in the air" (in the top right corner).

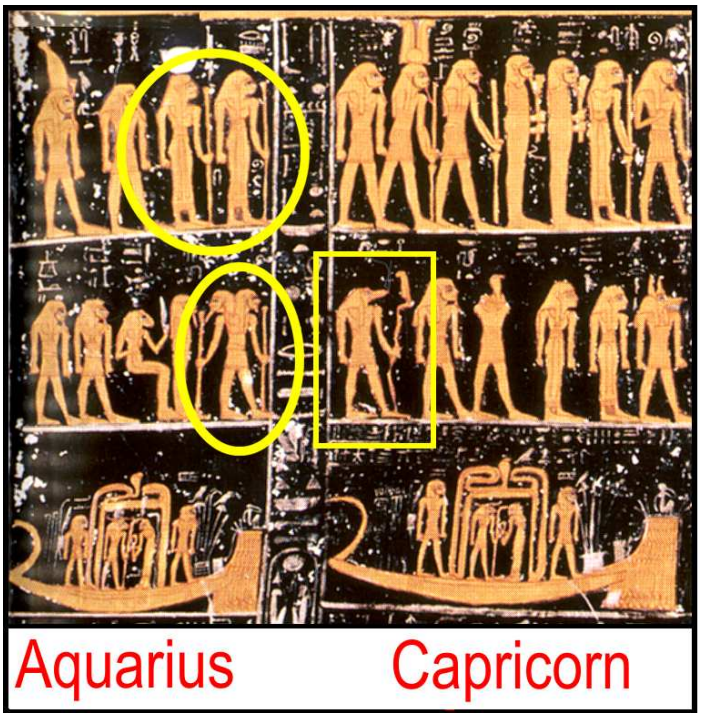

Figure 8.35: *Symbols of Venus and Mercury in the sector of Aquarius on the Ramses VI zodiac (RS). A non-planetary figure is shown in Capricorn.*

On Figure 8.34 we also show the representations of the other constellations from the zodiac (RS), including Capricorn, Sagittarius, Scorpio, Libra, Gemini, Cancer, Leo and Virgo, which are simply indicated by the numbers shown in the bottom of the zodiac. These numbers, which specify the position with respect to Aries, are the four identical figures for Cancer, five for Leo and six for Virgo.

It turns out that there is sufficient information on the Ramses VI zodiac to decode its main horoscope.

Figure 8.36: *Figures of travelers symbolizing the planets on the Ramses VI zodiac..*

8.5.3 Planets in the Main Horoscope on the Ramses VI Zodiac

All the planets of the main horoscope on the Ramses VI zodiac can be identified directly from Figures 8.32 and **??**, where we the zodiac is truncated after Capricorn.

In the left half of the zodiac (which is truncated after Capricorn) there are shown five groups of travellers holding walking sticks. Namely:

- In the upper row of the Aquarius sector, there is a group composed of two female travelers holding planetary walking sticks (see Figure **??**). It is clear that this is a representation of Venus shown in Aquarius (see Chapter 5);
- In the second row of the Aquarius sector, there is a two-faced male traveler holding a planetary walking stick (see Figure **??**). It is not hard to recognize that it must be a representation of Mercury (see Chapter 5). Consequently, Mercury was also in Aquarius;
- In the middle of the upper row in Taurus, there is a male figure with a planetary walking stick. This figure has the head of a ram with particular horns, which are twisted and pointing opposite directions. There is a small disc over its head (see Figure **??**). We have already encountered similar figures on other Egyptian zodiacs, for example on the Denderah zodiacs. See subsections 7.5.6 and Figure 7.12. On the Long Denderah zodiac, Jupiter also had horizontal horns and there was a small disk in-between. Consequently, on the Ramses VI zodiac Jupiter is shown in Taurus.
- Notice that next to the representation of Jupiter in Taurus, there is a sitting figure on a chair. There are exactly two such sitting figures on the Ramses VI zodiac (RS). The second one is in Pisces, in the second row from the top. Notice that the sitting figure in Pisces hold a planetary walking stick. It is most probably that these two symbols indicate that in the constellations of Taurus and Pisces there were two slowely moving planets — Saturn and Jupiter.
- As it is indicated by the sitting figure in Pisces, we expect to find there Saturn. Indeed, in the second from the top row, besides the sitting figure, there is a male figure holding a planetary walking stick (see Figure **??**). Therefore, on the Ramses VI zodiac Saturn was in Pisces.
- In the top row in Pisces, above Saturn, there is another male figure holding a planetary walking stick. The only option left is that it must represent Mars (see Figure **??**). In this way, we obtain that on the Ramses VI zodiac, Mars was in Pisces.

Notice that interchanging the symbols of Mars and Sturn does not affect the decoding of the main horoscope on the zodiac (RS) — both planets are located in Pisces. Since all the other planets were uniquely identified by their planetary attributes, we can say that the main horoscope on the Ramses VI zodiac is decoded.

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Let us point out that on the zodiac (RS), in the upper rows, which are reserved for the planetary symbols, there are other figures holding planetary walking sticks. More precisely, in Capricorn in its upper row, there are two male and one female figures holding sticks (see Figure **??**). Since there is a female figure among these symbols, it is most likely that this sequence may be associated with Venus. Let us recall that we have already identified the main figure of Venus in Aquarius, but it is still possible that Venus was in Capricorn. Therefore, it is appropriate to consider that all the possible locations of Venus, including both constellations of Aquarius and Capricorn. Our computations were based on all possible variants. However, in the final solution Venus turned out to be located in Aquarius — as we expected. On the other hand, notice that the walking sticks held by by the female travelers in Aquarius are equipped with a specific handles on their tops. One can not say this about the walking sticks, which are held by figures accompaning the "additional Venus" in Capricorn. Let us recall that on the Egyptian zodiacs the planetary walking stick is not just a simple stick, but it always has a special handle on its top (see subsection 5.4.1). However, these figures could definitely belong to the procesion of Venus.

Notice that in the sector of Capricorn, there is another figure holding something like a walking stick (See Figure 8.35). However, this sticked is curved and there is a cobra placed over its top. But, a snake-like-stick and a feather are the attributes of Mercury (see section 5.4.10). It seems that this figure belongs to the procession of Mercury, which is extending to Capricorn.

Finally, we have to identify on the Ramses VI zodiac the symbols of the Sun and Moon. On Figure 8.37 we show the Lower Part with the redish strip its bottom. It could be indicated by this color that the Sun was present in this area, i.e. in Aquarius, Capricorn, Sagittarius, Scorpio or Libra. There is no other syblo that could be considered as a pointer to the location of the Sun. Notice that this identification agrees with the location of Mercury and Venus in Aquarius.

On the other hand, it is logical to expect that the presence of Moon could be symbolized on the Ramzez VI zodiac in way indicating that it reflects the light from the Sun. Indeed, the presence of the sun was marked in red, so a similar change of colors could apply to Moon. Indeed, there is one sector on the zodiac, which is different from the other constellation sectors — Cancer. The boat symbolizing Cancer is white, while all the other boats are yellow or even yellow-redish in the area where we assumed the presence of the Sun. This can be a clear indication of the silver light of Moon. Therefore, we can conclude that Moon is shown in Cancer.

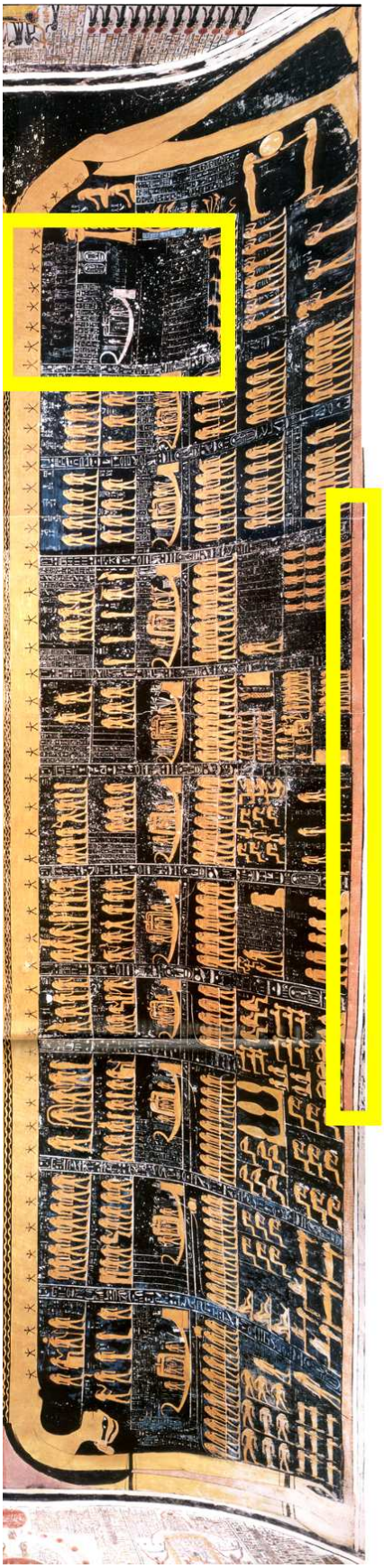

Figure 8.37: *Marking on the Ramses VI zodiac indicating the presence of the Sun and Moon.*

8.5.4 Main Horoscope on the Ramses VI Zodiac

In this way we have obtained the following decoding of the main horoscope on the Ramses VI zodiac (RS):

- **SUN** — in Aquarius, Capricorn, Sagittarius, Scorpio or Libra;
- **MOON** — in Cancer;
- **MERCURY** — in Aquarius;
- **VENUS** — in Aquarius or Capricorn;
- **SATURN** — in Pisces;
- **MARS** — in Pisces;
- **JUPITER** — in Taurus.

Let us present the input data for the program HOROS, which was used for this decoding of the main horoscope. The input files used for the computations is presented below:

```
ZODIAC: Ramses VI (RS)
CODE OF THE DECODING VARIANT: RS1
-----------------------------------------------------
----------------------DATA---------------------------
      SUN   MOON  SATURN JUPITER MARS  VENUS MERCURY
# FROM: ----------------------------------------#
       6.0    3.0   11.0    1.0   11.0    9.0  10.0
# TO: ------------------------------------------#
      11.0   12.0   12.0    2.0   12.0   11.0   11.0
# BEST POINTS: -----------------------------------#
      10.5    3.5   11.5    1.5   11.5   10.5   10.5
-------------------END OF DATA---------------------
-----------------------------------------------------
```

8.5.5 Final Solution for the Ramses VI Zodiac

After completing the calculations, we found that there were only two solutions for the Ramses VI zodiac belonging to the historical time interval from the year 3000 B.C. to 2000 A.D. These solutions are listed in Table 8.25 below.

Year of Solution	Date of the Solution	Mean Distance from the Best Points (in degrees)
1289 A.D.	February 4–5	8.8^o
1586 A.D.	February 20–24	9.8^o

Table 8.25: *Final solutions for the Ramses VI zodiac (RS).*

Let us point out that these two solutions fit perfectly the astronomical data shown on the Ramses VI zodiac, what is indicated by very low value of the mean discepancy from the best points. The exact planetary positions on the ecliptic on the days indicated by these two solutions are presented in Table **??** .

Positions of planets (in degrees) on the ecliptic J2000 Ramses VI Zodiac (RS) Year/Month/Day = 1289/2/4 Julian day (JD) = 2191900.00						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
333.5^o 10.2	125.3^o 3.3	354.4^o 11.2	52.9^o 1.0	1.4^o 11.4	343.1^o 10.8	349.1^o 11.1
Aquar	Cancer	Pisces	Tau/Ari	Pisces	Aquar	Pis/Aqu
Mean Distance from the Best Points = 8.8^o						

Positions of planets (in degrees) on the ecliptic J2000 Ramses VI Zodiac (RS) Year/Month/Day = 1586/2/20 Julian day (JD) = 2300395.00						
Sun	Moon	Saturn	Jupiter	Mars	Venus	Mercury
347.4^o 11.0	126.0^o 3.3	23.0^o 11.9	69.1^o 1.5	349.3^o 11.1	327.6^o 9.9	329.4^o 10.0
Pis/Aqu	Cancer	Pisces	Taurus	Pisces	Aquar	Cap/Aqu
Mean Distance from the Best Points = 9.8^o						

Table 8.26: *Planetary Positions on February 4, 1289 A.D. and on February 20, 1586 A.D.*

In conclusion, **on the zodiac discovered in the tomb of Ramzez VI there is encoded the date February 4–5, 1289 A.D. or February 20–21, 1586 A.D.**

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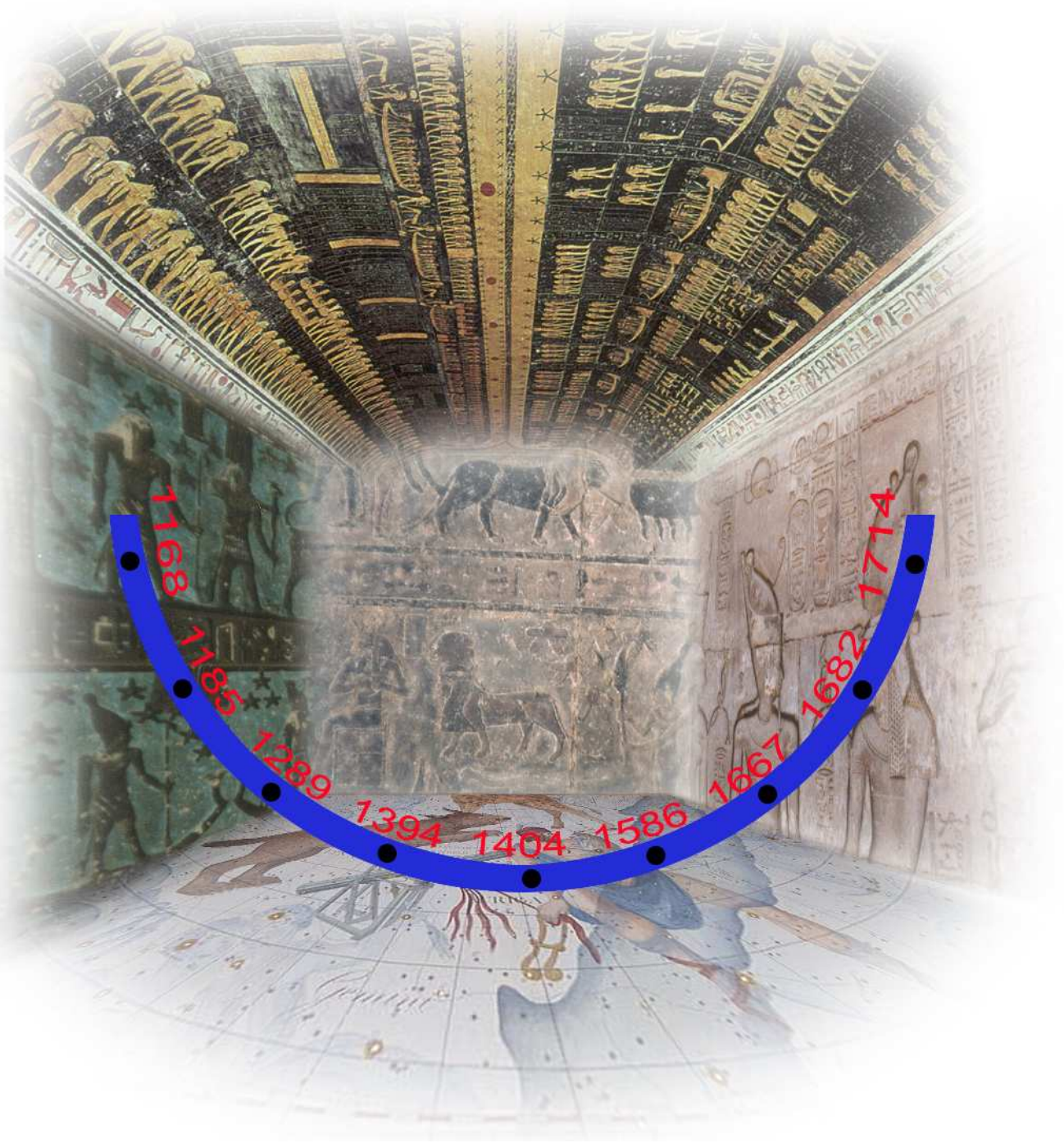
Chapter 9

Summary of the Astronomical Dating of the Egyptian Zodiacs



9.1 General Picture of the Dates on the Egyptian Zodiacs

On Figure 9.1, we show the graph representing the time axis on which we marked the dates of all the Egyptian zodiacs that were analyzed in this book.

On Figure 9.1, we applied colors to distinguish between different zodiacs on the graph. On the left we show the dates of the zodiacs from the Egyptian temples, i.e. the Denderah and Esna zodiacs. Let us recall that the obtained dates for these zodiacs were unique in the whole historical time interval. On the right of the graph, we have placed the dates for all the analyzed zodiacs from the Egyptian tombs. We have marked their coordinates on the time line with color dots — each tomb with a different color. In order to indicate that a pair of dates should be considered as one solution for two zodiacs form the same tomb, we connected the color dots with a small arc. Notice that some of the zodiacs found in the Egyptian tombs have multiple solutions, i.e. more than one final date was found for them. This was the case with some of the zodiacs having relatively small astronomical content, where the partial horoscopes were missing and there was no other astronomical information that could be used for the verification of the solution. For a single decoding of the main horoscope, it is possible sometimes to obtain several solutions in the whole historical time interval. If, in addition, there was more than one variant of decoding considered, even more admissible solutions could be found. Consequently, because of the absence of the additional astronomical information, in such cases, the elimination process couldn't be applied to incomplete solutions, and therefore multiple dates were obtained. This was the case of the Petosiris and Ramses VI zodiacs. However, in the case of the Athribis zodiacs the obtained dates were unique.

It is clear that the distribution of the dates on Figure 9.1 strongly contradicts Scaliger's chronology of ancient Egypt. It can not be true, what is presently preached by Egyptologists, that Egyptian history lasted for many thousand years before the Christian era. The astronomical evidence strongly indicates that it was in fact the epoch from the 10th to 16th century A.D. Moreover, the pyramids and great temples of ancient Egypt couldn't be constructed earlier than in the 14th century A.D. Notice that the dates encoded in the zodiacs found in the Egyptian temples point to epoch from the 12th to 15th century. However, this evidence can not be considered as a proof that the temples were build around the same time as it is indicated by the dates on the zodiacs. It is most probable that the temples were build much later then the events commemorated by these zodiacs took place. It could be even few hundreds years later.

Regarding the zodiacs that were painted in the "ancient" Egyptian tombs, based on the dating of Brugsch's zodiac, we can say that this "ancient" tradition was still present in Egypt even during the 19th century. Therefore, it is possible that many artifacts from the "ancient" Egyptian tombs,

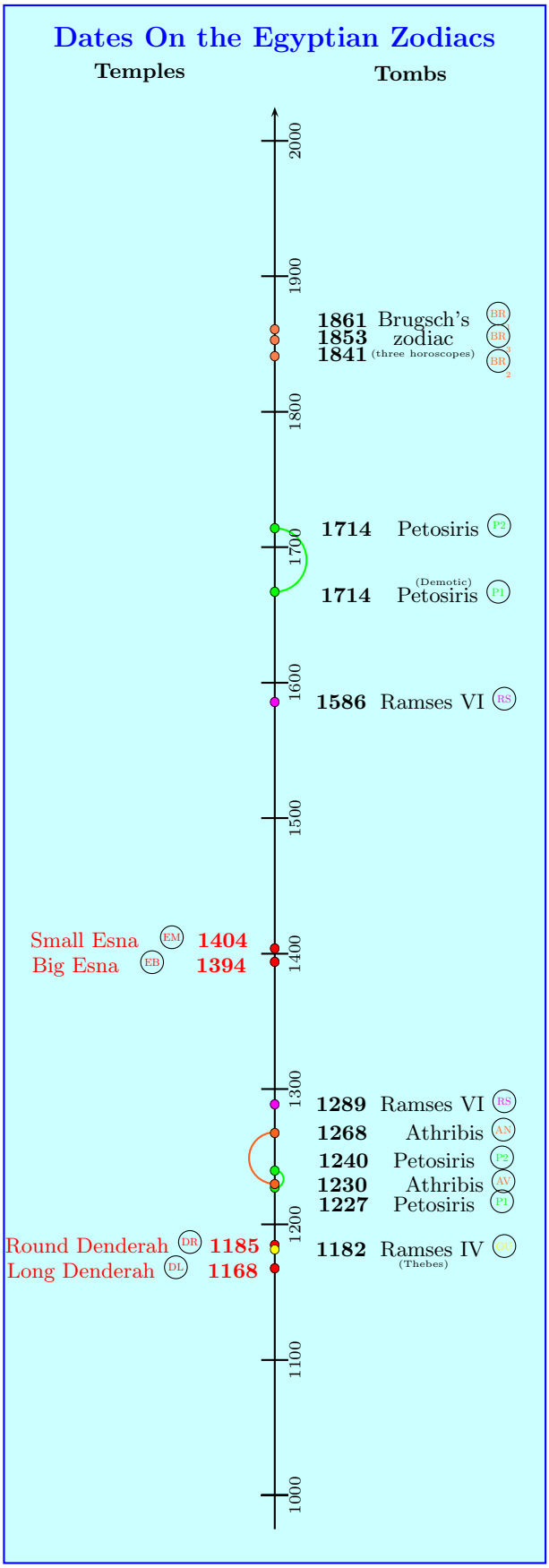


Figure 9.1: *Distribution of the dates encoded in the Egyptian zodiacs*

which are proudly displayed in the renowned museums, are simply paintings from the 19th century.

Let us summarize the dates obtained for the Egyptian zodiacs:

1. **Round Denderah Zodiac** (DR): the morning of March 20, 1185 A.D.
2. **Long Denderah Zodiac** (DL): April 22–26, 1168 A.D.
3. **Big Esna Zodiac** (EB): March 31 – April 3, 1394 A.D.
4. **Small Esna Zodiac** (EM): May 6–8, 1404 A.D.
5. **Athribis Zodiacs** of Flinders Petrie:
   - **Upper Athribis Zodiac** (AV): May 15–16, 1230 A.D.
   - **Lower Athribis Zodiac** (AN): February 9–10, 1268 A.D.
6. **Brugsch's Zodiac** (BR) containing three main horoscopes, each of them showing different date:
   - **Demotic Horoscope**: November 18, 1861 A.D.
   - **Horoscope without Walking Sticks**: October 6–7, 1841 A.D.
   - **Horoscope in Boats**: February 15, 1853 A.D.
7. **Thebes zodiac of Ramses VII** (OU): September 5–8, 1182 A.D.
8. **Petosiris Zodiacs** (P1) and (P2):
   - First Solution:
     Outer Petosiris Zodiac (P1): August 5, 1227 A.D.
     Inner Petosiris Zodiac (P2): March 24–25, 1240 A.D.
   - Second Solution (conditional for (P2)):
     Outer Petosiris Zodiac (P1): August 10, 1430 A.D.
     Inner Petosiris Zodiac (P2): April 17, 1477 A.D.
   - Third Solution:
     Outer Petosiris Zodiac (P1): August 2, 1667 A.D.
     Inner Petosiris Zodiac (P2): April 2, 1714 A.D.
9. **Ramses VI Zodiac** (RS):
   - First Solution: February 4–5, 1289 A.D.
   - Second Solution: February 20–21, 1586 A.D.

Notice that, although there are three final solutions possible dates for the Petosiris zodiacs, all of them are late medieval dates.

It is estimated by Egyptologists that the burial tradition in the Valleys of the Kings lasted for about 400–500 years[1]. Based on our astronomical dating of the zodiacs from the tombs, this period should be shorten to about 250–300 years. On the other hand, the epoch these burials should be shifted in time much closer to the present times.

Conclusion: We can claim with high probability that the events of the pharaohs epoch described in "ancient" history of Egypt took place not many thousand years before the Christian era, but during the epoch from the 11th to 15th centuries A.D. That means, "only" 400–1000 years ago. However, in the case of the great Egyptian temples, the dates encoded in the zodiacs indicate the epoch from the end of the 12th century till beginning of the 15th century A.D.

[1] See [180].

9.2 Stability of the Obtained Dates

The most important property of the obtained from the Egyptian zodiacs dates is their *stability*.

Firstly, all the astronomical solutions for the main horoscopes are "*locally stable*," i.e. for a given main horoscope, small modifications of its decoding did not cause any change of the calculated solution. We made sure to verify that for every considered variant of decoding, all the preliminary solutions remained stable for reasonable variations of the initial data, based on the reasonable interpretations of the zodiac. The admissible intervals for the planetary positions were always indicated with a large margin. In the case one planetary figure was standing next to another one, and their order didn't seem to be definite, all their possible configurations were always included in the initial data. In other words, at this stage of the astronomical dating, we tried not to miss even one preliminary solution for any reasonable interpretation of the considered variant of decoding.

Secondly, all the obtained final astronomical solutions are also "*stable in large*," i.e. even significant variations of decoding of the zodiac did not result in occurrence of any other final solution for this zodiac. In particular, this was exactly the case with the two Denderah and two Esna zodiacs. On these zodiacs the symbolism of the partial horoscopes was particularly plentiful, and it was very useful to eliminate all **random solutions**. In our opinion, all the complete solutions for the zodiacs from the Egyptian temples, are highly reliable and we are strongly convinced about their correctness. In addition, the obtained pairs of the dates for the Denderah and the Esna temples, indicate almost the same period of time. In the case of the Denderah zodiacs, the difference between the calculated dates was 17 years, while for the Esna zodiacs it was only 10 years. It is impossible to claim that such close distributions of the dates occured two times randomly.

The basis for the reliability of the obtained dates, for other, less splendorous, zodiacs relies on the fact that their designs were "linked" with other zodiacs. We had two such pairs of zodiacs, which were found in the same tomb: the Athribis and Petosiris zodiacs. In the case of Brugsch's zodiac, we there were three horoscopes encoded into one design. In such cases, the link between the related dates provided us with a highly reliable criterium to eliminate all the pairs of random solutions. There is a high probability, that the obtained in this way the final solution indicates the real dates encoded in the zodiacs.

Notice that all the dates for the Egyptian zodiacs are medieval. There is no way, they can be explain in the frames of Scaliger's chronology. If our computations simply resulted in "random" dates, why we didn't get any "random" date from the earlier epoch, for example, around the first century A.D. We are sure such a result would be welcome by Egyptologists, who persistently relay on Scaliger's chronology, but this is not the case. Notice that all the obtained dates belong to the time

interval, which perfectly fits the chronology postulated by the mathematical and statistical analysis (see section 1.9).

9.3 Unsolved Problems Related to the Dating of the Egyptian Zodiacs

When in the beginning of 2003 we succeeded in decoding of the zodiacs of Thebes type, we were able to obtain the dates for several other Egyptian zodiacs from the Valley of the Kings. However, we do not include these results in this book yet, except for the Ramses VI and Thebes (Ramses IV) zodiacs. The symbolism and the conventions of these type of zodiacs require a separate detailed study that goes beyond the format of this book. In fact, all the time we discover "new" Egyptian zodiacs, which we are now able to decode and date astronomically.

Many problems related to the symbolism on Egyptian zodiacs still remained unsolved. However, the achieved progress in the dating provides us with the astronomical pictures, which may hold the key to the complete understanding of the Egyptian conventions used on the zodiacs. It is clear that the research on the astronomical dating of ancient zodiacs will continue, and more unexpected results may be obtained.

9.4 Astronomical Dating of the Sumerian Tablets

Let us conclude our book on the astronomical dating of the Egyptian zodiacs with the following remark: not even one date that was obtained for the Egyptian zodiacs, agrees with the conventional chronology of Egypt. In fact all these dates strongly contradict the Scaliger version of chronology of Egypt.

In the context of the astronomical dating, a question arises in connection to the so called Sumerian Tablets, which are considered to be even more ancient than the Egyptian zodiacs. *How the obtained for the Egyptian zodiacs dates agree with the dating of the Sumerian Tablets?* It is commonly believed that the Sumerian Tablets were dated astronomically and, in fact, their dates confirm the correctness of Scaliger's chronology (see [184] and [183]). Is it really so?

We looked at the fundamental publication [184] of the Sumerian Astronomical Tablets, which contains English translations of several hundreds tablets. These tablets are dated from 652 B.C. to 165 A.D.

On the Sumerian tablets one finds descriptions of the planets and their locations among the zodiacal constellations. That simply means — they contain horoscopes. In the book [184], there is listed a large number of the dates, presumably obtained through the astronomical computations from the horoscopes on the tablets.

Let us point out that according to the published in [184] Sumerian tablets, there is not even one complete horoscopes described there. In order to expect a unique date during the historical time interval, a complete horoscope is required. However, all the Sumerian horoscopes are partial. In many cases, they simply talk about three or four planets only. Such horoscopes, as our readers can easily verify using the program HOROS, will produce a multitude of dates — in almost every century. With such a collection of choices, it is always possible to find a desired date belonging to the "expected" time interval, i.e. the epoch postulated by Scaliger's chronology. It is very difficult to consider this dating as a proof that Scaliger's chronology is correct.

In addition, on many Sumerian tablets some of the names of planets are missing. Sometimes thy are omitted, or there is simply a reference to a "certain" planet only. In such cases we can only guess what was the planet the ancient Sumerians had in mind. In particular, such "guesses" can be conveniently made based on the "requirements" related to Scaliger's chronology. It is clear that any chronology could be supported by this type of astronomical dating. Let us point out, that these datings based on "guessing" have nothing to do with the independent astronomical dating.

Figure 9.2: *The Sumerian Tablet No. 418.* (Taken from [184])

Let us point out that the dates associated by historians with the Sumerian tablets have nothing to do with their astronomical contents. Strangely, the astronomical data is ignored exactly in the case of those tablets, which contain more or less

complete horoscopes. It is probably disturbing for historians that these horoscopes refuse to confirm the epochs postulated by them.

Let us present an example — the tablet No 418 (see Figure 9.2) related to the 5th year of Darius II:[2]

"*The date ... adopted here is based on the planetary statements (Jupiter was in Leo, Venus and Mercury were in Taurus, Saturn was in Cancer). ... This date is unfortunately not confirmed by the few remaining observations. ... To make things worse, Venus was unvisible on VII 6, while she is reported as morning star on that date in obv. 2. In obv.3, the remark about the "northern horn" shows that the moon is to be restored at the beginning of the line; unfortunately ... moon had a latitude at about* $+3^o$ *when passing* δ *Capricorni which has a latitude of less then* -2^o*. ... In view of this conflicting evidence the text should be used with caution; ...*"

One can see from the above citation how incompatible is the astronomical data described in the tablets with the dates associated with them according to Scaliger's chronology. In fact, the "precision" of these astronomical verifications can hardly be called satisfactory. Notice that in the tablet No. 418 there was described a horoscope composed of only four planet: Jupiter, Saturn, Mercury and Venus. With such incomplete horoscope usually one can associate a lot of dates, from which usually it is easy to choose the date that is the most "convienient." Nevertheless, in this "convienient" solution Venus turned out to be invisible contrary to the statement made in the Sumerian tablet. In addition, on the table No. 418, there was even more precise astronomical information describing the location of Moon with respect to the star δ Capricorni. Here again, the confirmation of the Scaliger date couldn't be obtained.

In general, it follows clearly form the work [184] that the astronomical "dating" of the Sumerian Tablets provides no confirmation for the correctness of Scaliger's chronology. In fact, these tablets call for an independent dating according to scientific requirements based on their astronomical content. However, it is doubtful that such astronomical dating is possible at all. The available in [184] descriptions of the astronomical events on the Sumerian Tablets are not precise enough to produce a set of unique solutions. The dates obtained for the tablets are always multiple and scattered all over the historical time interval.

Of course, there is also another problem. How well the contemporary translators of the Sumerian Tablets understand the astronomical terminology used by "ancient" Sumerians. It is also possible that the true astronomical meaning of the Sumerian Tablets is completely different than it is portrayed by the specialist in this area.

[2] See [184], Volume 1, page 61.

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